● 133, 113 Andamans AZ2

[For a regional division of the Indian sub-continent see Chapter XIII, 6: Spate AW1 India.]

● 133, 113 Andamans AZ2

[For a description and discussion of the structure and relief of the entire Indian sub-continent, see 6: Spate, AW1 India, category 116, pp. 3-36.]

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[For general information on the distribution of various types of flora and its relation to climate and soil, see 6: Spate AW1 India, category 116, pp. 63-92.]

1: Radcliffe-Brown E-5 (1906-1908)1922
AZ2 Andamans AZ2

INTRODUCTION

THE Andaman Islands are part of a chain of islands stretching from Cape Negrais in Burma to Achin Head in Sumatra. This line of islands forms a single geographical system, as it were a submarine range of mountains, the highest points rising here and there above the surface of the ocean. Some 80 miles or so from Cape Negrais lies the first of the islands in the chain, Preparis Island, between which and the mainland the sea depth does not exceed 100 fathoms. Southwards of this the submarine ridge sinks to a depth of about 150 fathoms, rising again to form the small group of islands known as the Cocos, some 50 miles from Preparis. Geographically the Cocos may be regarded as part of the Andaman Group. Landfall Island, the most northerly point of the Andamans proper, is only distant from them some 30 miles, and the sea depth between does not exceed 45 fathoms. The Andaman Group itself consists of the Great and Little Andaman with their outlying islets, and occupies a distance approximately north and south of about 210 miles. Eighty miles to the south of the Andamans lie the Nicobar Islands, a scattered archipelago occupying a distance of about 160 miles from north to south. The sea between the Andamans and the Nicobars is over 700 fathoms deep. Deep sea also divides the Nicobars from Sumatra, which is about 110 miles distant from the most southerly point of Great Nicobar.

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This line of islands is part of a long fold extending from the eastern end of the Himalayas, which includes the Arakan Yomah Range of Burma and the Andaman and Nicobar

1: Radcliffe-Brown E-5 (1906-1908)1922
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Islands and finds its continuation in the islands off the west coast of Sumatra[1].

On the west the Andamans are separated from the coast of Madras, 700 miles distant, by the Sea of Bengal. On the east the Andaman Sea, a depression with a depth of over 1000 fathoms, separates the Andamans and Nicobars from the Malay Isthmus and Peninsula. Across the Andaman Sea, less than 100 miles distant from the Andamans, there runs a line of volcanic activity, marked by two small islands, Barren Island in Lat. 12° 15′ N. and Long. 93° 50′ E., and Narkondam in Lat. 13° 26′ N. and Long. 95° 15′ E.[2]

The Cocos, the Andamans and the Nicobars are now part of the Indian Empire. The Cocos Islands are occupied by a station for wireless telegraphy. In the Andaman Islands there is a penal settlement at Port Blair, to which are sent the criminals of India and Burma. The Nicobars are treated as one with the Andamans for administrative purposes.

Until the nineteenth century the Cocos Islands were uninhabited. The Andamans and the Nicobars have for many centuries been inhabited by two entirely different races. The Andamanese belong to that branch of the human species known to anthropologists as the Negrito race. They are short of stature with black skins and frizzy hair. The Nicobarese, on the other hand, resemble the races of Indo-China and Malaya, and have brown skins and lank hair, and are of medium stature.

The Andaman Islands consist of the Great Andaman and the Little Andaman, and a number of smaller islands. The Great Andaman may be regarded as one island, although it is divided by narrow sea water creeks into four areas, often spoken of as separate islands and called North Andaman,

[1] The formation of the Arakan Fold (including the Andaman and Nicobar Islands), dates from the middle of the Tertiary Period, and was apparently connected with the great movements that produced the Himalaya-Alpine mountain system and the Circum-Pacific Fold. The Andaman Sea, in the later Tertiary period, was prolonged much further to the north, over the region now occupied by the Pegu Yomah.

[2] This line of volcanic activity is a minor continuation of the Sunda Range of volcanoes of Java and Sumatra. It is continued northward, parallel to the Arakan Fold, as far as the extinct volcano of Puppadoung, east of Pagan, not far from Lat. 21°.

1: Radcliffe-Brown E-5 (1906-1908)1922
AZ2 Andamans AZ2

Middle Andaman, Baratang and South Andaman. It is a long narrow stretch of land with a much indented coast, surrounded by many smaller islands, of which the most important are Interview Island off the west coast, Ritchie's Archipelago on the east, Rutland Island at the extreme south, and the outlying North Sentinel Island. The length of the Great Andaman with Rutland Island is nearly 160 miles, while the breadth from sea to sea is nowhere more than 20 miles. The Little Andaman lies to the south of the Great Andaman, about 30 miles distant from Rutland Island, from which it is separated by a shallow strait with a maximum depth of only 21 fathoms. The island is about 26 miles long from north to south and about 16 miles wide.

Viewed from the sea the islands appear as a series of hills, nowhere of any great height, covered from sky-line to high-water mark with dense and lofty forest. The hill-ranges run approximately north and south, in the same direction as the islands themselves, and attain a greater elevation on the east than on the west. The highest point of the North Andaman is Saddle Peak (2402 feet), that of Middle Andaman is Mt Diavolo (1678 feet), while the South Andaman has the Mt Harriett Range (1505 feet), and in Rutland Island there is Mt Foord (1422 feet). There are no streams of any size. The water drains from the hills into tidal creeks running through mangrove swamps, often many miles in length. The coast is broken by a number of magnificent harbours. The shores are fringed with extensive coral reefs, and on these and in the creeks there is abundance of fish and molluscs.

The islands, save for the clearings of the Penal Settlement, are covered with dense tropical forest. There are few mammals, the only two of any size being a species of pig (*Sus andamanensis*, Blyth) and a civet-cat (*Paradoxurus tytlerii*, Tytler). The other mammals are a few species of rats, a tree-shrew and some species of bats. Of birds there are many different species, some of them peculiar to the islands. The reptiles include a considerable number of species of snakes, and a few species of lizards, of which the most noteworthy is the large Monitor lizard (*Varanus salvator*).

2:Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

131 siderable distance eastward of Great Andaman, but connected with the group, are two small uninhabited islands known as Narcondam and Barren Island, both of which contain volcanoes, though the latter only is active at the present day. To the south, and about midway between Great Andaman and the northernmost point of the Nicobar group, lies Little Andaman, consisting of a single island about 27 miles in length, and varying in breadth from 10 to 16 miles; there are also a few small islets near its coast.

None of the islands exceed 20 miles in breadth, and the area of the entire group is estimated at about 2,508 square miles, four-fifths of which are comprised in Great Andaman.

133 Nearly all the high land occurs in the vicinity of the east coast, shelving gradually towards the west, where few, and those but minor, elevations are to be found. The principal hills are: Saddle Peak[1] (2,400 feet) in North Andaman, overlooking Port Cornwallis; Ford's Peak (1,400 feet) on Rutland Island; and Mount Harriet (1,100 feet) in South Andaman, commanding the harbour of Port Blair.

132 The climate of the Andamans much resembles that of Lower Burmah, and the temperature throughout the year is very uniform; the variation in the shade during the dry season is about 22°, and averages 17° during the remainder of the year; the extreme variation throughout the twelve months may be estimated at 26°, viz., between 70° and 96°. The cool season sets in during the last weeks of December and early part of January, and the hot season lasts through the months of March and April. The S.W. monsoon commences in the latter part of April or early in May, and usually terminates about the end of October, but on the change in the direction of the wind to N.E. heavy showers frequently occur for several weeks, and even, though at rare intervals, in January and February. The average number of wet days in the year is 182, and the rainfall 116 inches; the dry season is usually characterised during the first two months by strong winds from N.E., which cause sickness and prove equally prejudicial to vegetation. Although it has been ascertained that many of the most severe cyclones which have occurred in the Bay of Bengal during the past twenty-five years have had their origin in the immediate vicinity of the Andamans, only one is recorded (viz., in 1864) as having visited the islands themselves; in the same period there have been a few earthquakes, the first of which mention is made took place in August, 1868, and the next in February, 1880, from which time several slight shocks were felt until, in December (31st), 1881, another severe earthquake visited the group, the effects of which were

[1] The only ascent on record of Saddle Peak was made in February, 1882, by Major M. Protheroe, C.S.I., and other officers of Port Blair.

2: Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

experienced on both the Indian and Burman coasts; another, though slighter, shock was felt on February 27th, 1882.[1] 132

Among the many noteworthy features of these islands are the numerous harbours in which, especially on the east coast, safe anchorage can be obtained at all seasons of the year; the most important and best known of these harbours are: Port Blair in South Andaman, and Port Cornwallis[2] in North Andaman; of both it has been said they may be classed among the finest harbours of the world, affording ample accommodation as well as shelter to even "half the British navy," in addition to which, from their central position in the Bay of Bengal, they present great advantages to vessels in need of refitting, and also as ports of refuge. 133

The water[3] in the harbour of Port Blair has been found to be remarkable for its high density, as is evidenced by the rapid oxidation of iron immersed in it; its extreme clearness has also attracted the notice of many, who have viewed through its pellucid depths the wonderful coral beds which abound in certain parts of the coast. The marvellous variety of the colouring to be found among these corals must be seen to be appreciated, but some idea of their wondrous beauty may be formed from the following extract:—"As we steamed along, visions of the splendours of the submarine world broke upon our view; . . . I feel quite unable to attempt the task of describing, much less conveying an adequate idea of the exquisite assortment of colour, of the varied forms of life which were included in every square yard of these tropical coral reefs. The most gorgeous combination of vegetable and animal life afford but a poor sub-aërial representation of these submarine gardens."[4] But to return.

[1] On the occasion of the disastrous earthquake in the Straits of Sunda (August 26th, 1883), a report as of a distant signal gun was heard at Port Blair at about 8 P.M. of that day, followed by several similar reports at irregular intervals during the next two days. It was thought at the time that a vessel was wrecked off the coast, and the station steamer was sent out to render assistance; at 7 A.M. on Monday (27th) the sea rose and receded thrice in the course of a few minutes.

[2] This was the harbour selected in 1824 as the rendezvous of the fleet conveying the expedition under Sir Archibald Campbell to Rangoon during the first Burmese war.

[3] The supply of water from the tanks and wells in the Settlement is pronounced on medical authority to be both good and plentiful, and no diseases have ever yet been traced to the use of these waters.

[4] *Vide* "Jungle Life in India," pp. 359-360, by V. Ball, Esq., F.R.S. The vivid description by the same writer of a coral reef at the Nicobars (*vide* p. 202) is so applicable also to those at the Andamans, that I feel the reader will thank me for appending it in this place:—"There are corals which in their living state are of many shades of fawn, buff, pink, and blue, while some are tipped with a majenta-like bloom. Sponges which looked as hard as stone, spread over wide areas, while sprays of coralline added their graceful forms to the picture. Through the vistas so formed, golden-banded and metallic-blue fish meandered, while on the patches of sand here and there the *holothurias* and various molluscs and crustaceans might be seen slowly crawling."

2:Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

133 The other harbours which may be mentioned are: Stewart's Sound, Port Campbell, Port Mouat, Kyd Island Bay, Port Andaman, and the Bay between South Andaman and Rutland Island There are besides many good anchorages, and several navigable channels have been discovered by successive commanders of the Settlement steamer, but in the absence of any other guide than Blair's old chart, which as relating to a coral-bound coast must require considerable revision at the present day, and with the knowledge that the extent of the shoals and reefs[1] is only approximately indicated in many parts, those unacquainted with the coast find it necessary to take a circuitous route and to exercise great care in proceeding from one point to another, especially on the northern and western shores, where the coral banks and reefs are known to extend as far as twenty miles seaward. Several creeks on the three main islands of Great Andaman are of a sufficient size to allow of the passage of boats for a considerable distance into the interior, and though of course these are of no little importance in opening up a country like the Andamans, they are chiefly valuable as affording a natural channel for the conveyance of produce from the extensive tracts of rich land[2] in their immediate vicinity, in lieu of the costly and indifferent land carriage which in the absence of such waterway would have to be substituted.[3]

000 The natural beauty of the scenery of the Andamans never fails to awaken the admiration of every visitor, and has been deservedly eulogised by various writers, one of whom (Prof. Ball) says: "Of all the places I have seen in Europe, Killarney can alone convey an idea of these scenes. The blue waters, the luxuriant emerald green vegetation down to the margin of the coast, and the passing showers which brighten all the aspects of nature, have their counterpart here."[4]

Various theories have been advanced with regard to the origin and affinity of the aboriginal population of the Andamans, but no certain information is obtainable in the matter. The statements of the early Arabian travellers, and also of Marco Polo, give grounds for believing that the Andamans were inhabited

[1] These are formed chiefly of *Caryophyllia, Madrepora, Porites, Meandrina*, and other reef-forming corals (Kurz).

[2] By means of a comparatively light embankment, these lands are capable of cultivation to the very borders of the creek.

[3] Probably ignorance, and not disregard of these and other considerations which might be adduced, has led to the suggestion by some visitors (including two able officers of long standing) that the bunding of the deep mouths of such creeks would prove highly advantageous by adding largely to the area of land suitable for paddy cultivation; had, however, their observations been made during the rains instead of during the dry months, their opinions would doubtless have been considerably modified.

[4] *Vide* "Jungle Life in India," by V. Ball, Esq., F.R.S., p. 362 (1880).

2;Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

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PLATE IV

BARREN ISLAND VOLCANO (HEIGHT, 1,015 FEET)

[facing p. 30]

2:Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

791 savage tribes,[1] imagine themselves gifted with superior wisdom, and can hardly be blamed if they endeavour to turn their talents to account by imposing a little on the credulity of their neighbours.

101 171 197 619 **Tribal Distribution.**—1. The inhabitants of these islands are divided into at least nine tribes,[2] linguistically distinguished, even if we reckon as one those communities to which I have already alluded under the title of *jărawa-*, among whom it is not improbable further divisions and dialects may eventually be discovered. The conjecture that they are one is merely based on the assertions of the people of South Andaman, and on the circumstance that all the weapons, utensils, huts, &c., of the *jărawa-*, which we have been able to examine, appear to be constructed invariably on the same model, while all such members of the various scattered communities as we have had the opportunity of observing, resemble each other in abstaining from the practice, so general among all the eight Great Andaman tribes, of shaving their heads and tattooing their persons. Still, these outward similarities are manifestly insufficient, affording as they do mere negative evidence, whereas our present knowledge, so tardily acquired, of there being inland communities, called *ē'rem-tâ'ga-*, dwelling in the heart of South and Middle Andaman, who are allied in all respects, save in their mode of life, with the *àryô'to-*, or coast communities of their respective tribes, would seem to justify the belief that hereafter the aborigines of Little Andaman will be found to present not only distinctions of this nature but differences also of dialect, as is the case with the inhabitants of both North and Middle Andaman, which are known to be divided into no less than six tribes.

161 619 2. As to the numerical strength of these several tribes it is impossible to speak with any degree of certainty, for, as you are aware, there is no part of the country which is not covered with jungle, more or less impenetrable to any but the aborigines themselves, while their capacity for estimating and expressing numbers is wholly inadequate to assist us in forming any conclusions on the subject. The surmise that the entire group contains about 4,000 souls is based on the calculation that the *.bō'jig-ŋgī'ji-* tribe with whom we are most intimate do not at the present day exceed 400, though at the time of our advent in 1858, they are believed to have numbered about 1,000.

133 **Topography.**—1. The chief geographical landmarks of these islands are :—

1st. *Saddle Peak*, a massive hill rising to the height of

[1] *Vide* Lubbock, "On the Origin of Civilisation," &c., 4th Ed., pp. 250–1.

[2] For the names of the various tribes, and the localities they occupy, the reader is referred to the accompanying map.

2: Man G-5 (1869-1880)1932 AZ2 Andamans AZ2

●133 2,400 feet, situated in North Andaman, and visible at a distance of 60 miles.

2nd. *Narcondam*,[1] a small hilly island, containing an extinct volcano, with an elevation of 2,330 feet, lying about 70 miles east of North Andaman.

3rd. *Barren Island*, 75 miles S.S.W. of *Narcondam*, and about 42 miles east of the nearest island of the Great Andaman group, from no portion of the coast of which is it visible. It contains an active volcano, the height of which is about 1,015 feet.

[501] 2. Until recent years[2] the first only of these was known to the aborigines, probably owing to the circumstance that they, at least the natives of Great Andaman, have never been seen to venture far out to sea in their frail and clumsy canoes. The name borne by this hill is *Pū·luga lâ·kà bang-* (*lit.* Creator his mouth), referring apparently to its size and inaccessibility, and to a large ravine running down its side. There is also a belief that Saddle Peak was the place of *Pū·luga-*'s[3] residence prior to the deluge.

823 825 3. The formation of rocks, valleys, hills, &c., they attribute to the will of *Pū·luga-*, but they assign the sources of the streams containing oxide of iron, *kòi·ob-chū·lnga-*, and the olive-coloured mineral, *chū·lnga-*, to the action of a poisonous snake, called *lâ·raba-*, well known to them.[4]

103 4. The names they give to the natural forms of land and water are as follows :—

Cape (point)—*tô·ko-chô·ronga-* [*chô·rongn-* = nose].
Isthmus—*tô·to-kī·nab-* [*kī·nab-* = waist].
Mountain—*bô·roin-*.
Valley—*pâ·rag-*.
Strait—*teg-pâ·rag-*.
Coast (shore)—*tgô·ra-* [*gō·ra-* = strong].
Fore-shore—*kē·wad-* and *bô·roga-*.
Island—*tàrchô·na-*.
Islet—*tōt-kai·cha-*.
Harbour—*clàrū·la-*.
Bay—*kō·bunga-*.
Creek—*jīg-*.[5]

[1] The probable derivation of this name will be given in Part II.

[2] Since amicable relations have been established with the South and Middle Andamanese, several members of these tribes have visited Barren Island by accompanying us in the station steamer The name by which it is now known to them is *mâla-tàrchô·na-* (*lit.*, Smoke Island), in allusion to the smoke which is almost always to be seen rising from the volcano, and which they account for by saying that it must be due to a fire which *Pū·luga-* kindled.

[3] *Pū·luga* represents to them The Creator. *Vide* "Religious Beliefs, &c.," paragraph 7.

[4] *Vide post* "Superstitions," paragraph 21.

[5] The legendary belief regarding the formation of creeks will be found under "Mythology."

3: Temple G-5 (1901) 1903 AZ2 Andamans AZ2

CHAPTER II.

DESCRIPTIVE.

I. Geography.—Position and General Description of the Andaman Islands—The Submarine Range between the Pegu Yomas and Sumatra—The Submarine Contours—The Great and Little Andaman—The Harbours—The Hills—The Scenery—Surveys.

II. Meteorology.—Commercial Value of the Meteorology—Climate—Cyclonic Storms—Rainfall—Weather—General Statistics—Tides.

III. Geology.—General Geology—The Subsidence of the Islands—Earthquakes—The Conchology—Marine Fauna—Economic Zoology—The Forests—The Timber and its Economic Uses—The Imported Flora—General Character of the Forests.

IV. History.—Ancient Notices of the Islands—Origin of the name—Mediæval and Modern Notices of the Islands—Modern History of the Islands and people.

I. Geography.

131 **Position and General Description of the Andaman Islands.**—The Andaman Islands, large and small, are said to number 204 and lie in the Bay of Bengal, 590 geographical miles from the Hooghly mouth, 120 miles from Cape Negrais in Burma, the nearest point from the mainland, and about 340 from the north extremity of Sumatra. Between the Andamans and Cape Negrais intervene two small groups, Preparis and Cocos; between the Andamans and Sumatra intervene the Nicobar Islands, all indicating a submarine range connected with the Arracan Yoma Range of Burma, stretching in a curve, to which the meridian forms a tangent, between Cape Negrais and Sumatra; and though this curved line measures 700 miles, the widest sea space is about 91 miles. The extreme length of the Andaman Group is 219 miles, with an extreme width of 32 miles.

The principal outlying islands are the North Sentinel, a dangerous island of about 28 square miles, lying about 18 miles off the west coast of the South Andaman; the remarkable marine volcano, Barren Island, 1,158 feet, quiescent for the last hundred years, 71 miles to the North-East of Port Blair; and the equally curious isolated mountain, the extinct volcano known as Narcondam, rising 2,330 feet out of the sea, 71 miles east of the North Andaman.

The land area of the Andaman Islands is taken as 2,508 square miles.

To the west of the Andamans, distant about 18 miles, are the dangerous Western Banks and Dalrymple Bank, rising to within a few fathoms of the surface of the sea and forming, with the two Sentinel Islands, the tops of a line of submarine hills parallel to the Andamans: to the east, some 40 miles distant, is the Invisible Bank with one rock just awash, and 34 miles south-east of Narcondam is a submarine hill rising to 377 fathoms below the surface of the sea. Narcondam, Barren Island, and the Invisible Bank, a great danger of these seas, are in a line almost parallel to the Andamans inclining somewhat towards them.

133 **The Submarine Range between the Pegu Yomas and Sumatra.**—Certain physiological facts have long been held, in combination with phenomena exhibited by the fauna and flora of the respective terminal countries, to point to the former existence of a continuous range of mountains, thought to be subaerial, from Cape Negrais in Burma on the north to Achin Head in Sumatra on the south. According to the doubtful authority of Wilford, Hindu legends notice this remarkable range, ascribing it to Rama, who attempted here first to

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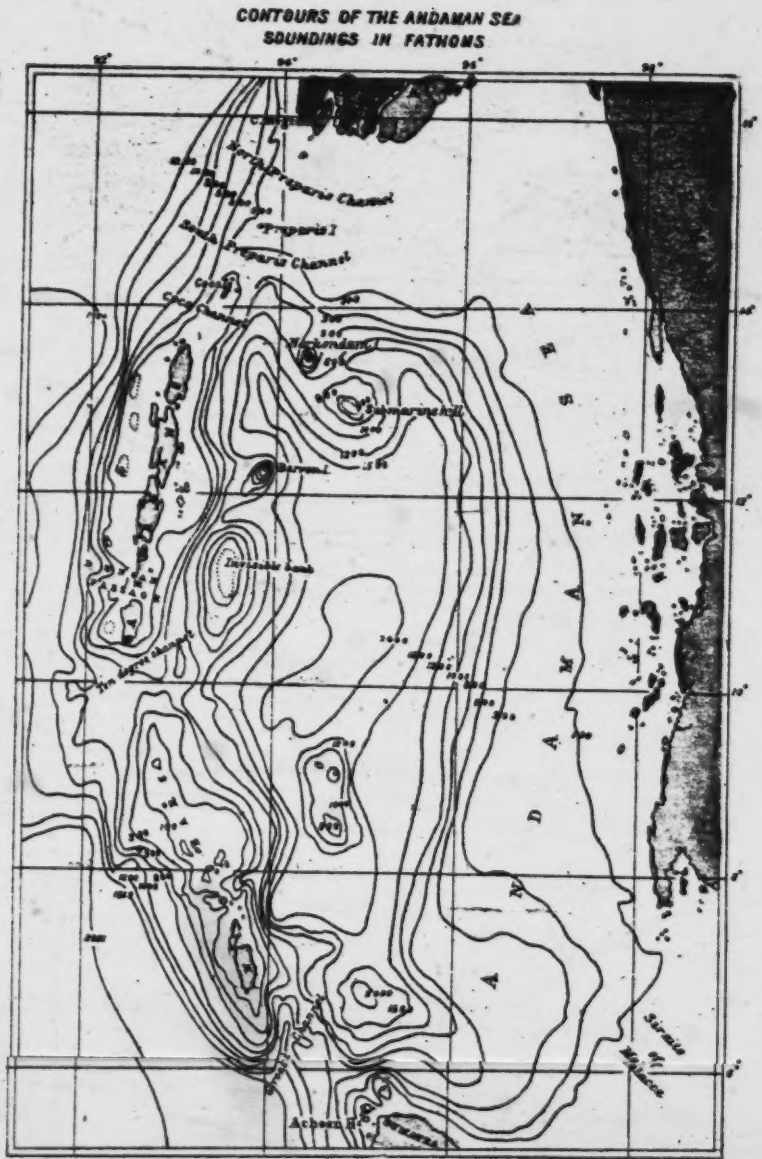

[facing p. 35]

3: Temple G-5 (1901) 1903 AZ2 Andamans AZ2

133 bridge the sea, an enterprise afterwards transferred to the south of India, and accomplished by the god at the more practicable point we call Adam's Bridge.

According also to Portman, the tradition of the South Andaman, or Bojigngiji, group of tribes is that Maia Tomola, the ancestral chief of the nation from which they all sprung, dispersed them after a cataclysm, which caused a subsidence of parts of a great island, divided it up into the present Andaman Islands, and drowned large numbers of the old inhabitants together with many large and fierce beasts that have since disappeared. As a matter of physical geography such a subsidence need not have been more than of 20 fathoms or 120 feet to convert one single island into the present Andaman group. Portman also notes, as tending to show the junction of the Andaman Islands with the mainland, that besides the South Andaman tradition, the people of the Little Andaman have names for animals that do not now exist and they cannot describe.

The acceptable evidence on this subject that I have been able to gather goes to show, on the assumption that, except in the case of isolated volcanic peaks, 200 fathoms is the extreme limit of the rising and sinking of land on the earth's surface, that it is possible that there was a time when the whole Andaman group with Preparis and the Cocos formed one continuous hill connected with Cape Negrais, and that this hill was separated by a sea of, say, 400 fathoms deep from the Nicobars considered as one island and the general Nicobar Island again by a sea of, say, 600 fathoms deep from Sumatra.

The Submarine Contours.—The accepted conclusive argument proving the isolation of the Andaman Sea from the connected oceans is that of Carpenter, who showed that the temperature of its great depths involved the existence all round it of submarine hills, the greatest depth of which below sea level could not be more than 750 fathoms. I have been at some trouble to draw contours of the depths of this sea from such data as the charts at my disposal afford and it seems to me that they fully support Carpenter's conclusion. The openings into the Andaman Sea from the connected oceans are:—from Bay of Bengal, the North and South Preparis Channels, the Coco Channel, Duncan Passage, Ten Degrees Channel, and the Great Channel:—from the Gulf of Siam, the Straits of Malacca. This last has a bar only a few fathoms deep and clearly isolates the Andaman Sea from the Gulf. The greatest depths in the other Channels are as under: North Preparis Channel, 47 fathoms; South Preparis Channel, 150 fathoms; Coco Channel, 36 fathoms; Duncan Passage, 17 fathoms; Ten Degrees Channel, 565 fathoms; Great Channel, 798 fathoms.

On either side the line of the Andamans and Nicobars the sea rapidly deepens to 1,000 fathoms and thence on the west in the Bay of Bengal to over 2,000 fathoms within 60 miles of the Nicobars and probably within 100 miles of the Andamans; and on the east in the Andaman Sea to 2,000 fathoms within 85 miles of the Nicobars and within about 95 miles of the Andamans. The contours thus show beyond doubt the existence of a lofty range of submarine mountains between Cape Negrais and Acheen Head rising from the ocean depths up to 15,000 feet and nowhere less than 6,000 feet on the east, and up to 15,000 feet and nowhere less than 10,000 feet on the west, thus separating the Bay of Bengal from the Andaman Sea. Of this great Range 700 miles long, taking 100 fathoms as a base, the continental and island summits are shown in one central line north to south as (1) Cape Negrais (Arakan Yomas) and Preparis Islands, (2) Cocos and Andaman Islands, (3) Nicobar Islands, (4) Acheen Head (Sumatra). The Western Banks, the Sentinel Islands and Dalrymple Bank are lower summits to the west of the central line. According to my contours outlying summits of detached spurs of the central line to the east are Barren Island and the Invisible Bank. They also show that Narcondam and the submarine hill to its south-east are separated from the Central Andaman and Nicobar Range, being summits of outlying spurs of the Yomas attached to Cape Negrais. This last fact supports the old assumption that the dormant Barren Island volcano belongs to the *immediate* Sunda group of volcanoes, while the long extinct Narcondam Volcano belongs to the Pegu group, both belonging to the *general* Sunda group.

As the arguments derivable from the submarine contours have not so far as I know been hitherto worked out, and as they may be thus of some general interest, I attach a map of the contours and some detailed notes thereon. It must be remembered that much of the ethnographic, as well as the natural history,

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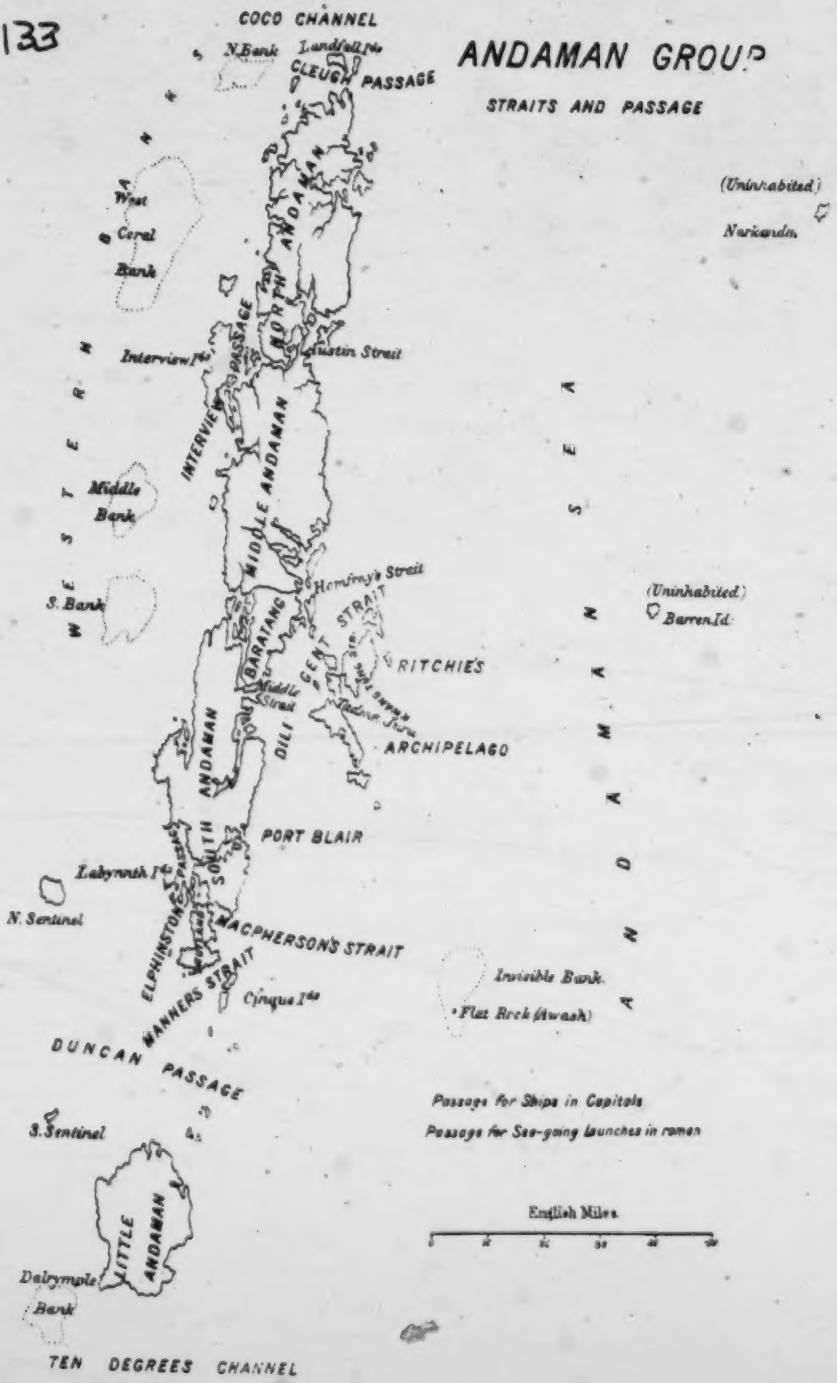


[Facing p. 36]

3: Temple G-5 (1901) 1903 AZ2 Andamans AZ2

133 speculation about both the Andamans and Nicobars depends on the assumed degree of their isolation from the Asiatic Continent.

Notes on the Ocean Contours.—(1) A narrow ridge runs between Great Nicobar and Acheen Head from ten to two miles wide with just less than 800 fathoms as the lowest depth of water on it.

(2) The Andaman Sea has been sounded to 2,000 fathoms about 84 miles east of Car Nicobar and the Bay of Bengal to well over 2,000 fathoms 61 miles east of Teressa. In the Andaman Sea the deep water of 2,000 fathoms or more does not run probably further north than 125 miles east of Port Blair. In the Bay of Bengal the deep water of 300 fathoms is probably distant about 100 miles west of the Andamans.

(3) Probably the deepest water between the Invisible Bank and the Andamans is under 900 fathoms, the Bank itself being the summit of a long hill running some 90 miles north-north-east to south-south-west directly on to Car Nicobar, the deepest point between it and Car Nicobar being some 900 fathoms.

(4) Probably the deepest water between Barren Island and the Andamans is under 1,000 fathoms, the island being the peak of a hill running some 35 miles north-east to south-west direct on to Rutland Island. The deepest point between it and the Invisible Bank is under 1,100 fathoms.

(5) At 94 miles due east of Stewart Sound is a patch of 377 fathoms, the summit of a submarine hill running apparently west to east some 45 miles. Between this hill and south-west to Barren Island and west to the Andamans are great depths probably over 1,500 fathoms. Between it eastwards to the Tenasserim Coast the depth is probably something over 1,200 fathoms. Between it and Narcondam 34 miles to south-west the depth is under 1,000 fathoms.

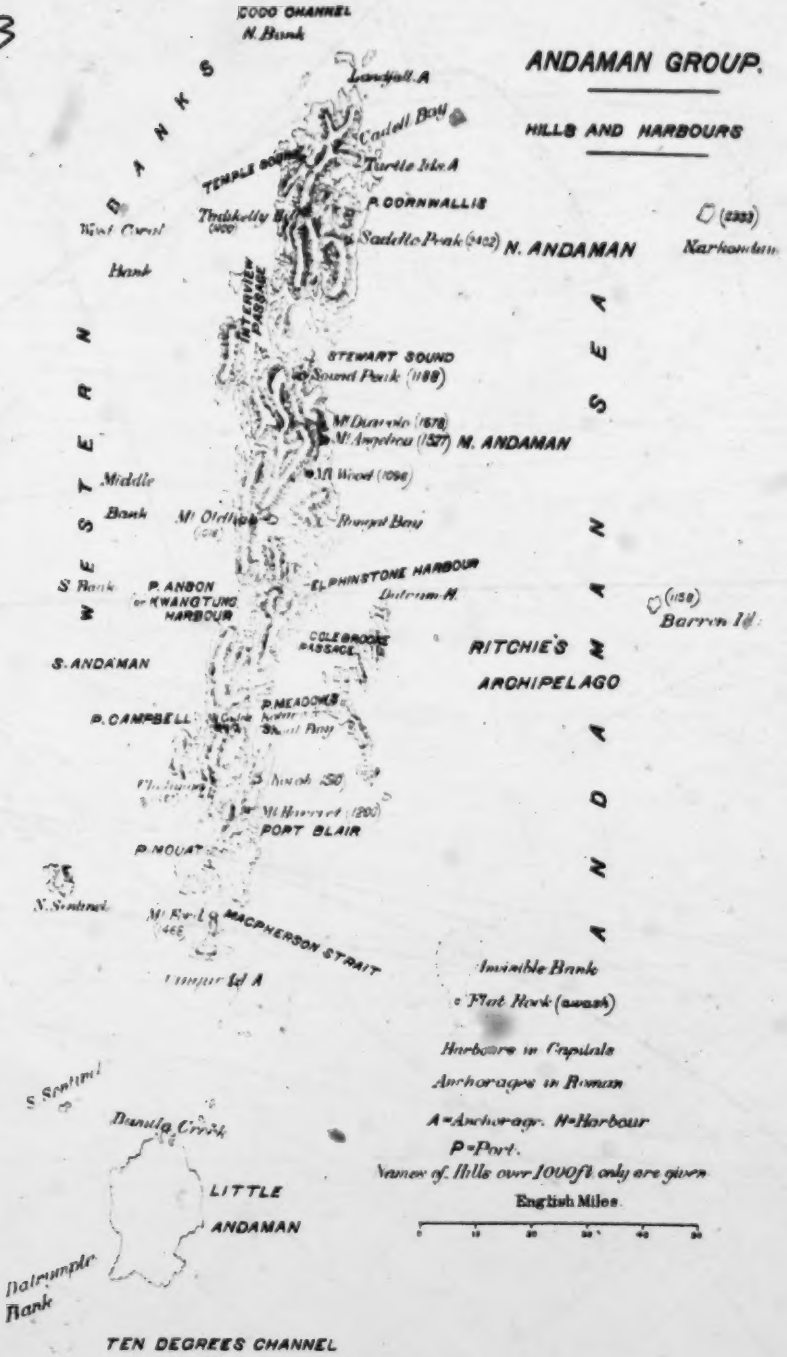
(6) Narcondam lies due south of Negrais Island and the 400 fathom contour runs round it and the coasts of the Andamans and Burma. The water between it and the Andamans, 71 miles to west, is deep, probably up to at least 1,200 fathoms. Between it and Barren Island, 74 miles to south-west, the depth is great, probably over 1,500 fathoms. Between it and the hill above mentioned to south-east the depth is under 1,000 fathoms. Between it and Negrais Island the deepest water is 411 fathoms in a hole to north-west, otherwise the depth here is not more than 362 fathoms.

(7) The 100 fathom line runs round all the Andamans, the Cocos and all the Western Banks, the two Sentinels and Dalrymple Bank. It runs also right round the Nicobars.

The Great and Little Andaman.—The main part of the Andaman group is a band of five chief islands, so closely adjoining and overlapping each other, that they have long been known as one, *viz.*, "the Great Andaman." The axis of this band, almost a meridian line, is 156 statute miles long. The five islands are (north to south)—North Andaman, 51 miles long; Middle Andaman, 59 miles; South Andaman 49 miles; Baratang, running parallel to the east of the South Andaman for 17 miles from the Middle Andaman; and Rutland Island, 11 miles long. Four narrow straits part these islands—Austin Strait between North and Middle Andaman; Homfray's Strait between Middle Andaman and Baratang and the north extremity of South Andaman; Middle (or Andaman) Strait between Baratang and South Andaman; Macpherson's Strait between South Andaman and Rutland Island. Of these only the last is navigable by ocean-going vessels. Attached to the chief islands are, on the extreme north, Landfall Islands, separated by the navigable Cleugh Passage; Interview Island, separated by the very narrow but navigable Interview Passage, off the west coast of the Middle Andaman; the Labyrinth Islands off the south-west coast of the South Andaman, through which is the safe navigable Elphinstone Passage; Ritchie's (or the Andaman) Archipelago off the east coast of the South Andaman and Baratang, separated by the wide and safe Diligent Strait and intersected by Kwangtung Strait and the Tadma Juru (Strait). Little Andaman, roughly 26 miles by 16, forms the southern extremity of the whole group, and lies 31 miles south of Rutland Island across Duncan Passage, in which lie the Cinque and other islands, forming Manners Strait, the main commercial highway between the Andamans and the Madras Coast.

Besides these are a great number of islets lying off the shores of the main islands.

● 133



[facing p. 37]

3: Temple G-5 (1901) 1903 AZ2 Andamans AZ2

●133 **The Harbours.**—The coasts of the Andamans are deeply indented, giving existence to a number of safe harbours and tidal creeks, which are often surrounded by mangrove swamps. The chief harbours, some of which are very capacious, are, starting northwards from Port Blair, the great harbour of South Andaman—*East Coast*, Port Meadows, Colebrooke Passage, Elphinstone Harbour (Homfray's Strait), Stewart Sound, Port Cornwallis, the last three are very large;—*West Coast*, Temple Sound, Interview Passage, Port Anson or Kwangtung Harbour (large), Port Campbell (large), Port Mouat, Macpherson's Strait. There are besides many other safe anchorages about the coasts for sea-going vessels: notably Shoal Bay and Kotara Anchorage in the South Andaman, Cadell Bay and the Turtle Islands in the North Andaman, and Outram Harbour and Kwangtung Strait in the Archipelago.

The Hills.—The islands forming Great Andaman consist of a mass of hills enclosing very narrow valleys, the whole covered by an exceedingly dense tropical jungle. The hills rise, especially on the east coast, to a considerable elevation; the chief heights being, in the North Andaman, Saddle Peak, 2,400 feet; in the Middle Andaman, Mount Diavolo behind Cuthbert Bay, 1,678 feet; in the South Andaman, Koiob, 1,505 feet, and Mount Harriet, 1,193 feet, the Cholunga range, 1,063 feet; in Rutland Island, Ford's Peak, 1,422 feet. Little Andaman, with the exception of the extreme north, is practically flat. There are no rivers and few perennial streams in the islands.

The Scenery.—The scenery of the islands is everywhere strikingly beautiful and varied, and the coral beds of the more secluded bays in its harbours are conspicuous for their exquisite assortment of colour. The scenery of the harbours has been compared to that of Killarney by Professor V. Ball, and no doubt they do recall the English Lakes. One view of Port Blair Harbour is strongly reminiscent of Derwentwater as seen from the Keswick end.

Surveys.—The whole of the Andamans and the outlying islands were completely surveyed topographically by the Indian Survey Department under Colonel J. R. Hobday in 1883—6 and a number of maps on the scale of two miles to the inch were produced, which give an accurate coast line everywhere and astonishingly correct contours of the inland hills, considering the difficulties presented by the denseness of the forests with which they are covered. For Port Blair and neighbourhood a series of maps on the scale of four inches to the mile were made. The exact latitude and longitude of Chatham Island in Port Blair Harbour were determined astronomically by Mr. Nicholson of the Great Trigonometrical Survey in 1861: latitude 11° 41′ 13″ N.; longitude 92° 42′ 44″ E. The marine surveys of the Andamans date back many years and one can go back to the days of Ritchie (1771) and of Blair and Moorsom (1788—96) for partial charts which are still usable. Brooker's surveys of 1867 added much knowledge about Port Blair, but the serious dangers of the western coral banks were not removed by surveys till 1888-9 under Commander A. Carpenter, when a great advance in the charts generally was made. His general chart is that now in use, corrected by subsequent surveys up to 1899. The coasts on the whole are fairly well charted, but some most necessary work still remains to be done before a voyage round these dangerous coral-bound coasts can be said to be free from anxiety. It is, however, worth noting that the long standing notice on charts that "the dangers of the coast of the North Andaman have not been surveyed" is now at last removed, and that the Coco Channel is made safe for ships.

II. Meteorology.

000 **Commercial Value of the Meteorology.**—Owing to the great value of the information to be obtained at the Andamans as to the direction and intensity of cyclonic storms and as to weather prognostications generally as regards the eastern and northern portions of India, a well appointed meteorological station has been established at Port Blair on Ross Island since 1868.

Two very serious considerations for commerce are involved here: *viz.*, timely and reliable warnings of storms in the Bay of Bengal and reliable weather forecasts. Accuracy in storm warnings and weather forecasts depends on the establishment of a number of meteorological reporting stations all over a given

132 **Weather.**—Calm weather can be counted on in February to April and in October. Fogs and chilly night winds are common in January to March in the valleys and inner harbour and also after excessive rain. Off shore breezes at night and on shore breezes in the day are most marked during the calm weather, due to the difference in temperature of sea and land. March and April are often hazy. Magnetic variation in the Andaman sea in 1904, 0° 40′ East, decreasing annually 2′. The normal barometric readings vary between 29·873 and 29·722, being highest in February and lowest in June.

General Statistics.—General meteorological statistics for Port Blair for the last seven years are :—

	1895.	1896.	1897.	1898.	1899.	1900.	1901.
Temperature.							
Mean highest in shade	April 90·1	April 94·7	April 94·0	April 90·3	Mar. 91·8	April 94·1	April 95·1
Mean lowest in shade.	Feby. 70·9	Feby. 71·7	Jany. 72·5	Jany. 70·5	Feby. 71·2	Dec. 72·9	Dec. 71·9
Highest in shade	April 95·2	May 96·9	April 95·8	April 93·6	April 95·6	April 97·0	April 97·1
Lowest in shade	Feby. 66·4	Feby. 66·9	Jany. 67·8	Mar. 65·2	Jany. 67·0	Jany. 68·0	Dec. 67·7
Dry bulb mean	84·6	85·3	85·2	84·3	84·8	86·6	87·7
Wet bulb mean	78·9	79·4	79·7	78·4	78·6	82·5	83·0
Rainfall.							
Most wet days in a month	Aug. 29	Aug. 28	July 29	July 26	Sept. 27	June 27	Aug. 29
Heaviest fall in a month	June 26·29	May 27·55	July 30·97	May 40·53	Sept. 24·93	Sept. 15·44	May 20·61
Months without rain	Jany. Feby.	Feby. Mar.	January.	Feby. Mar.	Nil.	February	Nil.
Total wet days	183	178	190	180	177	162	188
Wind.							
N. N. E.	Jany., Feby., Mar., Dec.	Jany. Feby. Mar., Nov., Dec.	Jany., Feby., Dec.	Feby., Dec.	Feby., Nov., Dec.	Jany., Mar., Nov., Dec.	Jany. Feby.
E. S. E.	April, Oct., Nov.	—	Mar., April Nov.	—	April, Oct.	—	—
W. S. W.	May, June, July, Aug., Sept.	June, July, Aug., Sept.	May, June, July, Aug. Sept. Oct.	May, June, July, Aug., Sept.	May, June, July, Aug., Sept.	May, June, July Aug., Sept.	May, July, Aug., Sept. Oct.
W. N. W.	—	April, May, Oct.	—	—	—	April	June.
E. N. E.	—	—	—	Jany., Mar., April	March.	—	—
S. S. E.	—	—	—	Oct., Nov.	—	October	April, Nov.
N. E.	—	—	—	—	January	February	Mar., Dec.
Clouds.							
Clouds are usually	P. K. & C. P. K. & P. C. *	C. & K.—P. K. & P. C. *	P. K. & P.C. *	Cu. N. Acc. Ci *	Cu. N. Acc. Ci *	Cu. Acc. N. Ci *	Cu. Acc. N. Ci *

* P. K = Pallio-Cumulus : C & Ci = Cirrus : P. C. = Pallio-Cirrus : K. = Cumulus : Cu. N = Cumulo-Nimbus : Acc. = Alto-Cumulus.

Tide.—The tidal observatory with self-registering gauge on Ross Island, established in 1880, is in latitude 11° 41′ N., longitude 22° 45′ E. The Port Blair tide tables are printed by authority from local data. The heights are referred to the Indian spring low-water mark, which for Port Blair is 3·53 feet below mean sea level. The mean range of greatest ordinary springs is 6·6 feet. The highest high-water and the lowest low-water are 8·0 feet above and 0·8 feet below the datum above mentioned. The apparent time of high-water at the full and change of the moon is 9h. 36m At various points of the great harbour of Port Blair the actual times for the tide depend on wind, strength of current, and distance from the open sea. The average variation in time of high tides at the several important points is from 18m. to 57m. later than Ross and in height it is from 20 inches less to 17 inches more than Ross. Wind and current will at these points affect time by as much as 29m. either way, and height by as much as 8 inches either way.

III. Geology.

135 **General Geology.**—There has been no geological survey of the Andamans, but expeditions by experts have been officially undertaken to make preliminary 133 examinations of the islands. These examinations have been carried on under practical difficulties of every kind, not the least being the dense and lofty forests with which the entire islands are covered. Judging by the reports of such

MAP OF THE EARTHQUAKE LINE IN THE ANDAMAN SEA.

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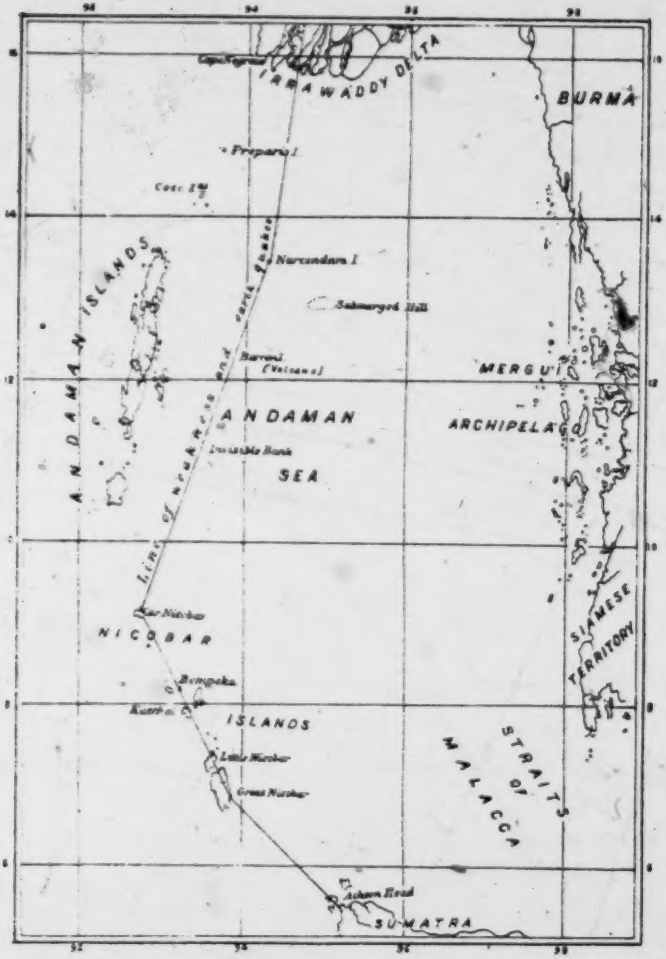

facing p. 41

135 expeditions, the submarine ridges forming these islands contain much that is
133 geologically characteristic of the Arakan Yomas and formations common also to the Nicobars, to the islands off Sumatra and to Sumatra itself. The older rocks, common also in the same form to the Nias Islands on the West Coast of Sumatra are probably early tertiary or possibly late cretaceous, but there are no fossils to indicate age. The newer rocks common to the Nicobars and Sumatra are in Ritchie's Archipelago chiefly and contain radiolarians and foraminifera. There is coral along the coasts everywhere and the Sentinel Islands are composed of the newer rocks with a superstructure of coral, but no atoll is known in the vicinity of the Islands. There is a good deal of serpentine rock, also some jasper, chromite, and copper and iron pyrites, and small pockets of coal. About Port Blair a firm grey sandstone identifiable with the Negrais rocks occurs with interbedded slaty shales, and not infrequently nests of coaly matter and occasionally of conglomerate and pale grey limestones. This sandstone is the characteristic rock of the neighbourhood and is generally, if not always, non-calcareous. In the Archipelago and over a large area in the Andamans, the islands are formed of soft limestones made of coral and shell sand, soft calcareous sandstones and soft white clays, with occasionally a band of conglomerate. Green and red jaspery beds, similar to those of Manipur and Burma and the Nicobars, are found, which may belong to the same series as the sandstones and shales. On Entry Island in Port Meadows are beds of probably volcanic origin, perhaps later than the Port Blair sandstones. Intrusive rocks of the serpentine series and a scoriaceous rock resembling lava occur in the Cinque Islands, Rutland Island, and in spots on the South and Middle Andamans. Hard breccias of volcanic origin are found at Namunaghar in the Penal Settlement and yield an excellent building stone. Good red clay for bricks is found abundantly in pockets. Lime of the best quality is obtained from old coral, but a workable limestone exists in limited quantities. A pretty reddish building marble is also found. Red ochre (*kaiol*) is found in considerable quantities in pockets and used, when mixed with gurjan oil, as an excellent covering for shingled roofs. Mica in probably workable quantities has been found about Navy Bay Hill in Port Blair Harbour.

133 **The Subsidence of the Islands.**—A theory of a still continuing subsidence of the islands was first formed by Kurz on his investigation of the vegetation in 1866 and has since been confirmed by Oldham in his geological report of 1884, though with some reluctance owing to the fact that the Arakan Coast to the north and the Nicobars are showing signs of recent elevation. The subsidence seems to be of recent origin, and signs of its continuance, most markedly on the East Coast, are to be found at several places:—Port Mouat, Ranguchang on the East Coast of the South Andaman near Port Blair, Outram Harbour and Havelock Island in the Archipelago, the northern ends of the Little Andaman, the North Sentinel, and the North Andaman. The extremely interesting islands of Narcondam and Barren Island are volcanoes of the general Sunda group, the extinct volcano of Narcondam belonging apparently to what is known as the Pegu group and the quiescent Barren Island to the Sunda group proper. Barren Island was last in eruption in 1803, but there is still a thin column of steam from a sulphur bed at the top and a variable hot spring at the point where the last outburst of lava flowed into the sea, showing lately a temperature of 107° Fahr.

Earthquakes.—Although the Andamans lie along or at any rate are close to a recognised subterranean line of weakness, earthquakes of great violence have not so far in the short time of British occupation been recorded. Recorded dates of earthquakes are August, 1868; February, 1880; and then shocks at times till December 31st, 1881; February, 1882; August, 1883; July, 1886; July, 1894; October, 1899. The sound of the great seismic disturbance in the Straits of Sunda on August 26, 1883, was heard at Port Blair at 9 P.M. of that day and the extra tidal waves caused thereby were felt at 7 A.M. on the 27th. The great Assam Earthquake of 1897 was not felt at all.

It is possible that the reason for the Andamans escaping violent earthquakes while the Nicobars are subject to them is that they are just off the line of greatest weakness, which may run from Sumatra through Great and Car Nicobar, Barren Island, Narcondam to the Arakan Yoma.

9:Sarkar D-5 (1948) 1962 AZ2 Andamans AZ2
Jarawa

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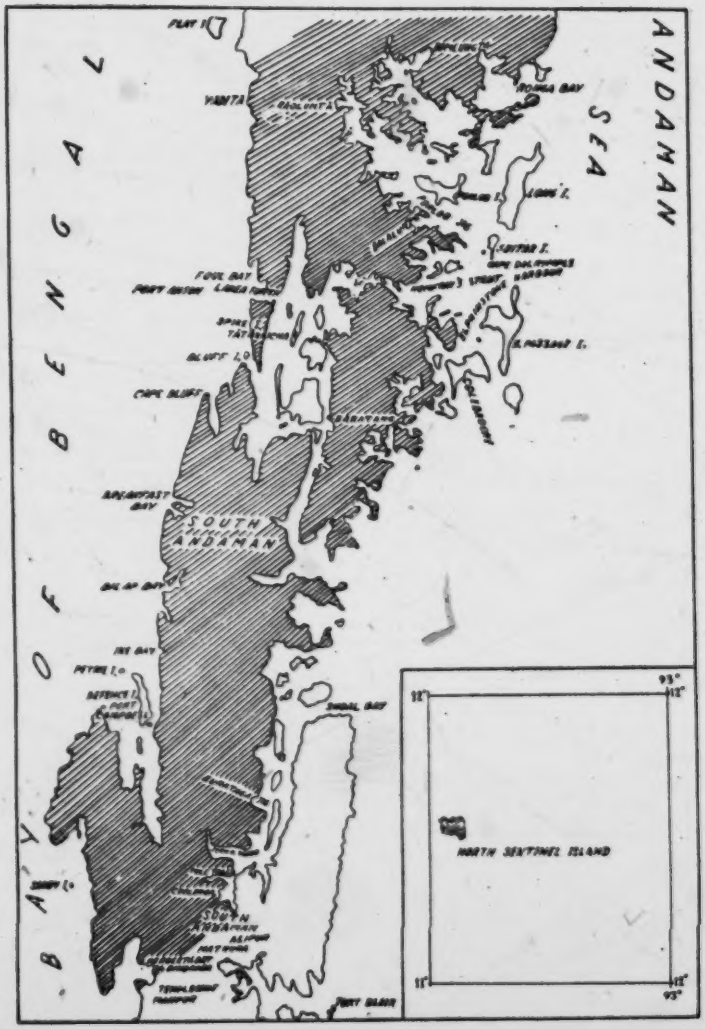

Fig. 1

10:Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

161 177 182 Of the two main groups of aborigines, the Great Andaman Group and the Little Andaman Group, the former being the most widespread and numerous in the Great Andamans has become completely non-existent depicting the example of the decay within an extremely short time, especially since the impact of the foreign people. The fate of the later group is also quite shattering—the Jarawas have experienced both numerical decay and territorial shrinkage and the Onges are the only tribes who live exclusively in the Little Andaman but they have been also facing the signs of decay.

133 A glance at the map of the Andaman islands and adjacent countries shows the continuity of these islands with the Arakan Yoma of Burma in the north and with the Indonesian islands in the south. The islands of both the Andaman and Nicobar groups are primarily of sedimentary formations of the Eccene period with occasional igneous intrusions. Later formations of coral are also quite widespread. The surface topography of the regions is typically flat-topped being typical of the sandstone regions and the peaks are in most cases formed of igneous intrusions. The islands are comprised of a number of longitudinal ranges running from the north to the south and in between the ranges short streams flow. The heights of the hills are generally 1000′ and never exceed 2500′.

132 The islands experience a high annual temperature and the yearly rainfall is as high as 130 inches in Port Blair and the amount decreases as one moves to the north and the east. The ameliorating influence of the sea is quite appreciable.

131 With an area of 2508 square miles and the number of islands being as many as 204, only 4 main islands, North Andaman (490.20 sq miles), Middle Andaman (561.00 sq miles), South Andaman (359.51 sq miles) and Little Andaman (289.90 sq miles) have an area of more than 100 sq miles and the rest are sufficiently small in size either to command human settlement or economic activity.

101 The economy of the tribal people is of the primitive form of hunting and collecting though the precise modes of living vary to some extent depending upon the nature of environment under which they have to live. The knowledge of distribution and of actual number of these aborigines is far from accurate. The Andamanese were the most widespread in all parts of the Great Andamans and in the South Andaman they (Aka bea) had to remain vigilant against the possible attacks and territorial expansion of the Jarawas. The Andamanese, as said earlier, have completely died out. The Jarawas, though have dwindled to a negligible number,

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

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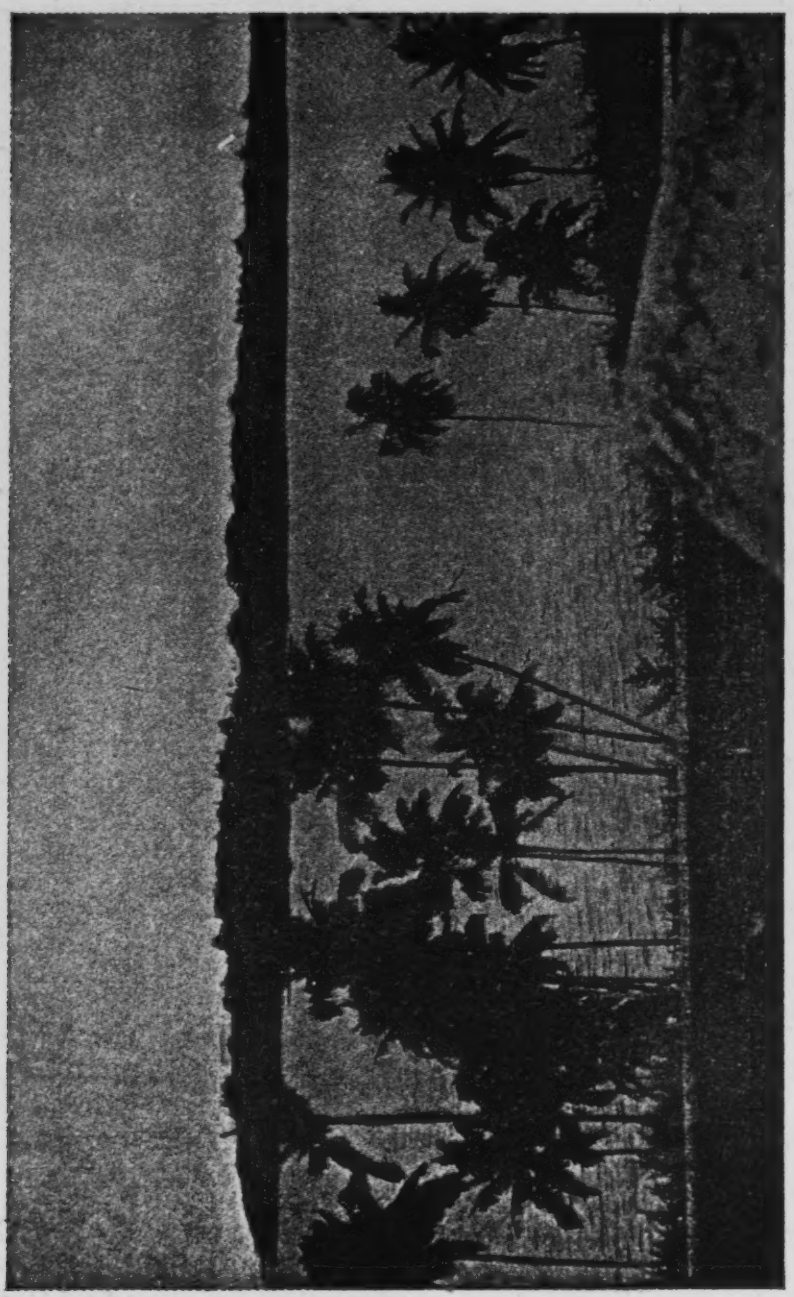

A Panoramic view of an island of the Andamans.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

[P. 11]

CHAPTER III

PHYSICAL SET-UP

The Andaman & Nicobar Islands form a part of the continuous ridge which runs form the Cape Negrais of Burma through the Preparis and Coco Islands to the Andamans and continues further to the Nicobars and Sumatra. The whole ridge has a geological affinity with the Arakan Yoma of Burma and Sumatra and Java. The ridge is primarily of Eocene formation and forms a part of the great Alpine-Himalayan system. Prof. Gregory holds the view that "the main line continues eastward through the Himalaya until the resistance of the Chinese plateau has traced it southward and part of it now lies beneath the Bay of Bengal, it reappears in Sumatra and continues through Java and across the Malaya Archipelago."[1] But some modifications of Gregory's view have been achieved and presently it is believed that this ridge is a loop of the main Himalayan axis comparable to the Persian loop in western Asia and Apennine loop in Europe.[2] The ridge is not continuous but is interrupted in many places, of which the 3 main channels are worth considering. The depth of the channels increases from north to south. 133

(1) Preparis channel in between north and south Preparis islands has a depth of over 500 fathoms.

(2) The Degree Channel, between the Andamans and the Nicobars, is approximately 400 fathoms deep.

(3) Great Channel lying between Great Nicobar Island and Sumatra is about 750 to 800 fathoms deep.

The peaks of the mountains now form the islands and in some places the coastline slopes very steeply to the ocean.

GEOLOGY OF THE ANDAMANS

The present knowledge of the geology of the islands is largely the outcome of the investigations done by R. D. Oldham (1885), Kurz (1868), Gee, and G. H. Tipper. Even at present a thorough geological knowledge of the islands has not been achieved and this has been due to a number [114]

1. Gregory, J. W.—The Structure of Asia, London, Methuen. [113]
2. Swell, R. B. (1925)—Geography of the Andaman Basin, Geographic and Oceanographic Researches in Indian waters, Mem. Asiatic. Soc Bengal IX. No. 1.

[text continues on p. 13]

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

MAP OF THE GEOLOGY OF THE ANDAMANS

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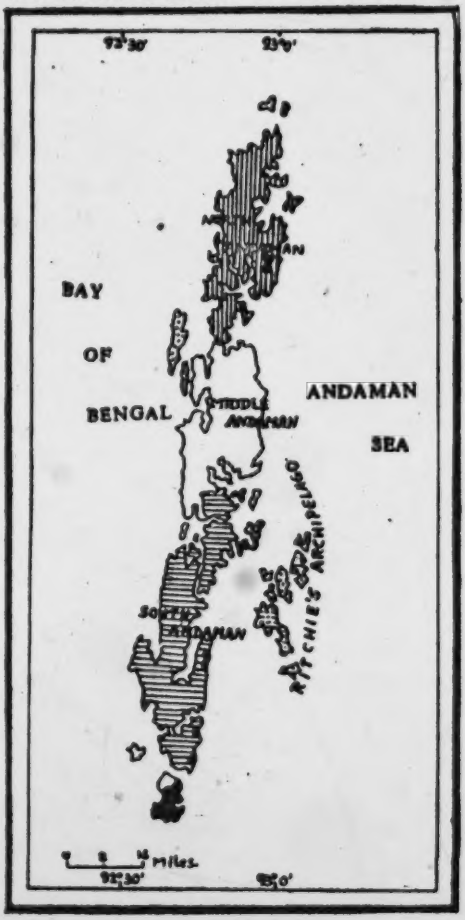

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- UNSURVEYED
- MIOCENE CLAYS OF RITCHIE'S ARCHIPELAGO.
- MIOCENE BURDIGALIAN FORAMINIFERAL LIMESTONES.
- SANDSTONE OF SOUTH ANDAMANS.
- EOCENE CONGLOMERATES OF N. & M. ANDAMANS.
- CRETACEOUS. SERPENTINE SERIES.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

of reasons. Firstly, a thorough survey of the islands is very difficult because of the dense forests and hostile aborigines. Secondly, the Government also cared little to take pains for initiating such a work. Regarding the inconveniences of geologising Tipper writes "the thickness of the jungles may be judged from the fact that our rate of progress varied from half a mile to a mile an hour. The dense jungle with a lack of exposures made geologising very difficult."[1]

Rink first postulated that the Andaman-Nicobar ridge was elevated to its present height from ocean bottom. He describes the chain of islands as consisting "partly of those stratified deposits which occupied the level bottom of the sea before their appearance, and partly of plutonic rocks which pierced through the former and came to the surface through upheaval.

To the two above-mentioned formations has to be added a third, which is the result of the chemical and mechanical destruction of the plutonic masses; it is local and consists of clays and pebbles derived from the underlying strata."

On the whole, the mountain ranges of the Andamans are of sandstones of Eocene Age with intensive rocks of serpentine in places. Large parts of the North Andaman have been grouped under the Archipelago Series by Oldham. Tipper considers the conglomerates of North and Middle Andamans as a facies of the Eocene deposit. Between the mountain ranges which run north to south, some undulating ground is found which often consists of impermeable blue clay beds, indurated shales and conglomerates containing pebbles of quartz and jasper. Coral reefs and the raised beaches form the recent and sub-recent formation of the Andamans. The formation of the Andaman-Nicobar ridge has been assigned to late Cretaceous age.

Oldham has distinguished two sedimentary formations in the Andamans besides serpentine series. He named them as

(1) Port Blair Series, &
(2) Archipelago Series[2]

The Port Blair series is so named because it is dominant in and around Port Blair, i.e., in the South Andaman. The rock types are gray sandstones with interbedded slaty shales, frequently consisting nests

1. Tipper, G. H.—The geology of the Andaman Islands with reference to the Nicobars. Mem. Geol. Sur. Ind., Vol 35, Part 4.

2. Oldham, R. D.—Notes on the Geology of the Andaman Islands, Rec. Geol. Sur. of Ind., Vol. 18, Part 3, 1885.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

133 of coaly matter and occasionally beds of conglomerate and pale gray limestone as subsidiary members.

The Archipelago series, as the name implies, is dominant in the islands of the Archipelago group. It consists of soft limestones formed of coral and shell—and, soft calcareous sandstones and soft white clays with occasionally a band of conglomerates.

Later on G. H. Tipper further clarified the geology of the Andamans and as analysed by Tipper, the 'Port Blair Series' and 'Archipelago Series' of Oldham correspond to Eocene (Lower Lutetian) and Miocene formations respectively. According to Tipper, the greatest authority of the geology of the Andamans, the following formations have been distinguished in the Andamans:—

Recent and sub-recent	... Raised beaches and coral reef etc.
Miocene	... Clays of Ritchie's Archipelago.
Miocene (Burdigalian)	... Foraminiferal limestones, shell marks of Paget Island.
Eocene (Lower Lutetian)	... Conglomerates of the North and Middle Islands. Sandstones of the South Islands.
Cretaceous	... Serpentine Series.
Pre-tertiary	... In part lower Cretaceous, scattered expanses of quartzites, jaspers and porcellanic limestones.

Of all formations, the Eocene rocks are most widely prevalent. They occupy the 3 main islands i.e., North, Middle and South Andamans and have got two facies of the same deposit. In the North and part of the Middle Andamans the prevailing rock is conglomerate while in the South Andaman it is sandstone.

The Sandstone Area of the South.

The sandstones of the South are even-grained blue grey micaceous sandstones but are sometimes non-micaceous and calcareous intercalated slabs are frequent. Conglomerates also occur in white quartz pebbles of sandy matrix. The rocks have experienced honey-comb weathering because of the irregular distribution of the cementing materials.

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[114] It should be remembered that the geological survey of the Middle Andaman has not been done properly.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

The Conglomerates of the North.

The Conglomerates, as said, occupy almost the whole area of the North Island. The Conglomerates vary considerably in character from a very coarse form with large rounded pebbles to a sandstone. The pebbles are usually rounded and not angular. 133

Miocene (Burdigalian) Deposit.

Foraminiferal limestones occupy large areas of the west coast of the Middle and North Andamans including Interview, Paget, Whitecliff and Thorn hills islands. These beds rest directly but unconformably on the Eocene conglomerates. The rocks vary in degree in different places. The rocks of Interview island are compact limestones with a few quartz grains, that of Paget island are soft foraminiferal sands. On Interview island a large number of long pits, narrow and of considerable depth are found. According to Tipper, they are "due to the falling in of the roofs of the underground streams." The limestone is in places very conspicuous and this feature has boldly made its appearance because of the hardness of the limestone and its action with the rain water.

Other Miocene Rocks.

These rocks have been classified by Oldham as the 'Archipelago Series.' The strata composing these islands consist of soft non-calcareous clays. The conglomerates of the North and Middle Islands, as has already been said, were classified under this group. But later investigations by Tipper and others proved the distinction of the two series. Almost the whole of the Ritchie's Archipelago is composed of this series. There is a good deal of controversy regarding the origin of this clay formation. Ehrenburg (1850) holds the view that this series has been elevated from a considerable depth below the sea level and this is proved by the absence of $CaCO_3$. As Boggild (1916) has shown that the absence of $CaCO_3$ is a characteristic feature of this deep-sea deposit, these non-calcareous clays are held to be of deep-sea deposit and believed by Ehrenburg to be identical with the deposits found in Barbadoes. But the absence of $CaCO_3$ in the deposits near the mouths of the rivers have also been shown by Swell (1925). But what is now accepted is the view held by Tipper and Oldham. They believe that the clay deposits in the Andamans and those in the Nicobars are geologically identical and moreover, have arrived at the conclusion that the deposit has been formed by the breaking down of the older ser-

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

133 pentine rocks and the deposition took place in comparatively shallow water in an estuarine or brackish water sea.

Serpentine Series.

These are igneous rocks covering large areas in the Andamans. They occur at Saddle peak and Saddle hill, Rutland and Cinque islands and many other places. The chief rock is a darkgreen serpentine with veins of chrysolite. The serpentine is basic in character and is derived chiefly from olivine and in part from horn-blende. Somebody believes that the serpentines intruded into the Tertiary sediments but evidences of contact metamorphism could be detected in such a case. In the basic rocks great alteration due to contact metamorphism does not take place, but at least some traces of it should be found around the great mass of Saddle peak had it intruded into the adjacent tertiary sediments. But such is not the case. This serpentine series synchronised with the great intrusions of serpentines, peridolite grabbos and clorite in Baluchistan and elsewhere in India which are of upper Cretaceous age. The Eocene conglomerates of the North Andaman are formed of the fragments and pebbles of the serpentines.

The Pre-tertiary Sedimentary Rocks.

Red and yellow jaspers, quartzites and pink and white porcellanic limenstones are the pre-tertiary sedimentary rocks which occur in isolated patches. The exact age of the rocks has not yet been determined. Weathered jasper pebbles are very common in the Eocene conglomerates of the North Andaman. Similar occurrences of jaspers and quartzites are found in Manipur and Arakan Yoma.

The Recent and Sub-Recent Formations.

The recent formations of the Andamans are the raised beaches and coral reefs. The growth of the raised beaches and coral reefs has been analysed in the light of the upheaval of the Andaman-Nicobar ridge which is believed to be still rising. This process of upheaval is slowly continuing and the same seems to be the case further to be north in the Arakan district of Burma.

The South Sentinel Island is composed of corals raised to a few feet. The N. Sentinel Island is also said to be of raised coral. Swell also detected one or two localities of reef coral that now form part of the shore and are raised considerably above the high water level. Since these beds must have originated at some depth below sea level it seems clear that elevation has taken place quite recently.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

Hence the formation of the coral reefs and raised beaches can be accounted for only if we believe in the recent upheaval of the Andaman-Nicobar ridge. Let us see the evidences that are in favour of this upheaval and those against it. Swell and Tipper believe that the Andaman-Nicobar ridge has experienced an apparent elevation of land which is only possible through the eustatic change of water-level. They have put forward a number of arguments that are as follows: 133

(1) The formation of coral reefs is possible only if there be an apparent or true elevation of the land.

(2) Throughout the tropical belt there are evidences of an apparent elevation of land in comparatively recent times.

(3) At the South West corner of Rutland Island in the Andaman Group, there is a raised pebble beach, situated 5'-6" above the top-level.

(4) At the southwest end of the westermost of the Twin Islands, off the west side of the Rutland Island, is a raised beach of shingle-conglomerates, about 6' ft. above high water-mark. This apparent upheaval of the land i.e. fall of the sea-level is believed to have been caused by the climatic fluctuations in the Quaternary period causing glacial and interglacial periods which resulted in a fall and rise of the water-level respectively.

But Kurz (1868) does not believe in the recent upheaval of the Andamans, but he holds the opposite view. The advocacy of Kurz in favour of the sinking of the Andamans is also due to a number of reasons.

Kurz had his conclusion from the botanical aspect of the coastal region. Kurz says, "some of the stumps of the trees (along the shore) proved to belong to such species as never grew in the mangrove swamps, and in any locality such as that in which they are now standing. They appeared to me to belong to *Pongamia, Erythrina, Thespesia* and even to *Manuscops Indica*, accompanied by strongly buttressed trunks. Also trunks of *Bruguiera gymnorhiza* are frequent and of a larger size than those which grow close to the shores but apparently agreeing with those which are everywhere found further up the creeks. All these (except the last mentioned) are trees which never occur in the mangrove swamps, but in the sandy soil just behind them or else bordering the sea where the shores are very steep and not adapted to the formation of mangrove swamps."[1] This evidently leads one to believe that the 133 137

1. Kurz. S—On the vegetation of the Andaman Islands, Calcutta. [113]

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

[133] [137] Andamans are sinking so that the trees which are found in the sandy soils behind the mangrove swampo are seen to be amidst them.

The sinking state of the Andamans has been further shown by quoting the reports of the Andaman Committee (1858)[2]. It is stated that the sea had encroached upon some 40′ or 50′ feet since the first settlement at Chatham Island in Port Cornwallis so that the store house that stood up there has been destroyed by the sea since the abandonment of the place since 1796. Again the Hamfray's strait changed a good deal in a very short margin of time. The easiness with which Helfer[3] in 1858 sailed through the strait became unnavigable later on except for small boats, as pointed out by the Andaman Committee. These facts not only prove the sinking state of the islands but also the rapidity with which the sinking is taking place. But the view has been strongly disputed by Tipper and Swell. Swell believes that whatever evidence that is found in favour of sinking is completely due to local change of level and Tipper argues that the coastal regions have slipped downwards to the sea giving rise to the evidences of sinking. He says that the structure of the Andamans may allow such slips into the sea.

Thus the enigma of the problem remains unsolved. Even in recent years the Ross Island off the Port Blair coast has been found to sink down into the sea. We have to scrutinize that this sinking which is evidenced in many parts of the Andamans is whether due to a new phase of sinking after the cessation of the upheaval of the islands which created the coral reefs, raised beaches etc. or due to the slip of the coastal region into the sea.

The direct connection of the Andaman and Nicobar islands with the mainland is still a controversial matter. But it is held by Mr. Kurz that the Andamans were connected with the mainlands which he concluded largely from his observations of the botanical aspect of the islands. In describing the flora of the Andamans he remarks "one may presume that a great number of species which originally grew in countries now submerged between these islands, Burmah and Hindoostan, have been repelled by the advancing sea and vegetation has thus become comparatively richer in generic types as the area grew smaller." Swell argues if at all any land connection of the islands with the mainland would have occurred, it would have surely been broken before the evolution of

[113] 2. Bonington, M.C.C.—The Andaman and Nicobar Islands, Census of India, 1931.

3. Helfer, a Russian geologist, while prospecting the islands in search of gold was killed by the aborigines.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

the mammalia took place because no indigenous land mammal occurs in any of these islands with the possible exception of a species of Paradoxurus and an insectivore which have been captured in the Andamans, but which, so far we know, do not occur in any of the Nicobar Islands. Again Boden Kloss (1903) from a study of the mammalian and avian fauna reached the conclusion that these islands were never connected with the mainland. Since the mammalia made their appearance towards the close of the Triassic period and the Andaman-Nicobar ridge did not apparently rise from the sea-bottom before the late Cretaceous epoch, it is certainly difficult to see how any connection with the mainland can reasonably be postulated. But the geologists believe that originally the whole chain of islands was continuous presumably above sea-level but the continuity of the original mountain has been broken by wide gaps which, in the western part of the Burmese-Malay arc, for example, are larger than remnants.

PHYSIOGRAPHY OF THE ANDAMANS

The Andamans abound in hills and lack in lowlands. From a distance the islands look like a long north-south running vista of domes. The hills are so low that they may be called domes. The hill-ranges have a north-south alignment and between these systems lie depressions where either the sea encroaches and forms a longitudinal bay or plain lands. The cost line is not broken everywhere but so in places such as the southeastern coast of the Middle Andaman, southeast coast of the North Andaman, northwest coast of North Andaman, western coast of the Baratang Island. Here the coastline seems to be of emergent type and the mangrove swamps encroach far into the sea (c. f. Sunderban area) and this feature is particularly significant in the east coast of the Middle Andaman. The whole coast seems to be mantled by a dense cover of mangrove swamps for miles together. The views of Mr. Kurz regarding the recent sinking of the island seem to be true from the physiographic outline of the coastline. Here also the answer of the question is a problematic one as to whether the Andamans are really sinking or not. The evidences of sinking have been argued to be due to local causes only by Mr. Swell or due to the slip of the coastal region towards the sea by Mr. Tipper. Hence the question is still a controversial one and the authoritative suggestions made by Mr. Swell, Mr Tipper and Mr. Gee cannot be taken as final and this problem again needs other forms of analysis from the other morphological studies of the islands.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

131 The Andamans consist of 204 islands of which the important islands of the main body from north to south are North Andaman, Middle Andaman, Baratang Island, South Andaman, Rutland and Little Andaman. Another group of islands lie some 15-20 miles off the east coast of Middle Andaman and they are primarily a group of a few islands-Neill, Havelock, Peet Is, Wilson Is, John Lawrence Is, Henry Lawrence Is, known as Ritchie's Archipelago.

PHYSIOGRAPHY OF THE ANDAMANS

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10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

As has already been said, main Andaman group of islands is of Eocene formation (with sandstones in the South and conglomerates in the North) and the Ritchie's Archipelago is of later formation i.e. of Miocene age, built up of clays and forminiferal limestones. From a symmetry of the alignment of the mountain ranges, the Andamans can be divided into a few physiographic regions. 133

(1) The Cholunga Range in South Andaman (it lies in the middle of the South Andamans) and its continuation through the mountain ranges along the west coast of Middle Andaman to Ranger Island.

(2) The Mount Harriet Range along the east of the South Aadaman continue through the Baratang range to the hill range of North Andaman.

(3) The West Coast Range has its continuation in the Interview Island.

(4) East Coast range of North Andaman runs down towards the south to the East Coast ranges of Middle Aadaman.

(5) Intervening lowlands in between these longitudinal mountain ranges.

(6) Coastal Lowlands.

Regarding the mountain ranges, on the whole, some peculiarities have been observed. It is observed that this range of mountain system which is a continuation of the Arakan Yoma and runs right upto Sumatra has a gradual decrease and then an increase in height from north to south. A list of important mountains in series from north to south are as follows:— 103 133

	Name of the peak		Height above the sea level	
Arakan Range, Burma	Chypotong	...	8386	feet
	Chinsikiatong	...	6012	„
	Mengootsan	...	3600	„
Andaman-Nicobar ridge	North Andaman	...	2902	„
	Middle „	...	1678	„
	Little „	...	600	„
	Car Nicobar	...	200	„
	Batti Malv	...	150	„
	Choura	...	343	„
	Katchal	...	835	„
	Little Nicobar	...	1428	„
	Great Nicobar	...	2705	„
Sumatra	Batu Mukurah	...	6371	„
	Sinobong	...	12,140	„

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

PHYSIOGRAPHIC DIVISIONS OF THE ANDAMANS

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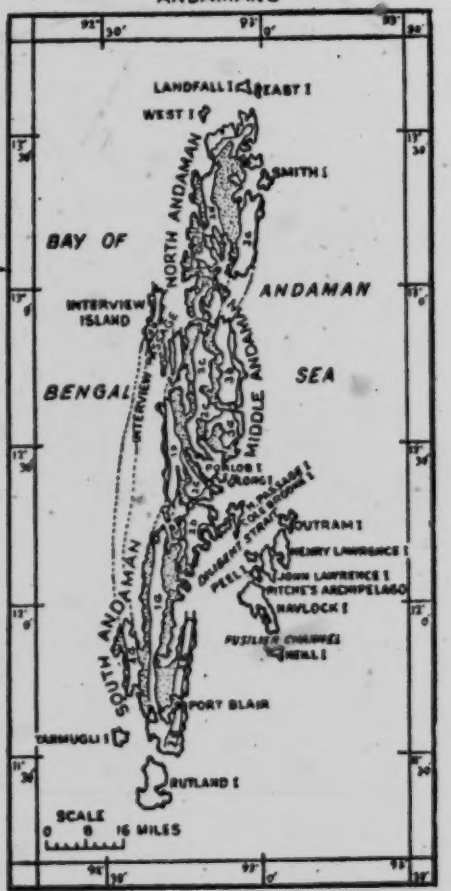

133 According to Swell, these variations in height are due to (1) an alteration of the pitch of the axis or (2) a variation in the rate of weathering and denudation in different regions. Swell says "A gradual fall towards the south and a subsequent rise in the level of the ridge, the differences between the highest peaks at each end, which rise to well over 8000' and the lowest of the peaks in the middle, namely, the island of Batti Malv which is only 150' above sea-level, is at the least some 8000' or approximately

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

1340 fathoms and it would appear probable that there has been, since the first formation of this mountain chain, a secondary depression that has lowered the level of the range in this area by approximately this amount." Molengraff[1] has called attention to the fact that similar depression, though on a smaller scale, exists further to the south in the continuation of the chain through the Malay Archipelago to the east of the Tima island, though on Tima Island itself there is incontestable proof of a post-tertiary elevation in the shape of a succession of coral reef terraces that are raised high above the present sea level.

The alignment of the hill systems in the Andamans, though not fully, but closely resembles the basin and range topography. In between the mountain ranges lie the longitudinal bays into which a number of very short torrential streams flow from both sides. The Andaman Committee observed that "the highest land wherever seen is on the eastern side" and that "the watershed is therefore chiefly to the west and it is consequently on that side that the marshy localities will most probably be found". But this observation is far from true which will be evident from the discussion below.

The east coast has really higher hills, but in the west coast also we find hills above 1000′ in height (1109′ in the Middle Andaman). Again, the second view is wholly untenable because of the fact that there is abundance of marshy localities in the east coast region than west coast.

Again, a greater number of rivers as well as the important ones viz, Batapur, etc. flow into the east coast.

West Coast Range of South Andaman and its continuation into the Interview Island is probably the lowest hill-system in the Andamans. The peak-height rises more than 800′ ft. Typical sandstone topography is manifested in the landscape of the region where all the hills are flat topped.

The hill ranges of the west coast, especially of the south west being under the direct impact of the southwest monsoons are lower than that of the east because of greater rainfall in the west, particularly the southwest, which results in a rapid erosion of the hills and, consequently lowering in height.

Cholunga Range and its continuation upto the Rangers Island are one of the highest ranges of the Andamans. It runs through the middle

1. Molengraff, G.A.F., Modern deep-sea researches in the East Indian Archipelago, Geog. Jour, 1921.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2

133 of South Andaman, where on its both sides are longitudinal bays. Further the range runs along the west coast of the Middle Andaman and merges into the Ranger Island. In this range the important peaks from south to north are Mt. Ford (1426') in Rutland, Cholunga (1057') and Cadell (1163') in South Andaman and one unnamed peak (1016') in the west coast of Middle Andaman.

Further east, the longitudinal range is the Mount Harriet Range which runs further north through Baratang Island and the middle of the Middle Andamans to the west coast range of North Andaman. The Mt. Harriet Range in South Andaman is the highest part of this region which rises steeply from the east coast of South Andaman and the peak heights are Mt. Harriet (1196') and Koyob (1509'). In Baratang and Middle Andaman the height of the range decreases considerably and in the former the height never exceeds 700' feet. Again, in the North Hudson peak-height of 1109 ' is observed.

Along the east coast of North Andaman and Middle Aadaman lies the highest mountain range of the Andamans and next to it is the Cholunga Range. The important peaks in North Andaman are Saddle Peak (2402') and Jire Miku (2247'), the former being the highest peak in the whole of the Andamans. In Middle Andaman, peak heights of Mt. Dianolo (1678') and many others of more than 1000' have been observed.

In general the hill-ranges are low in height never exceeding 2500' and they send out spurs in all directions. On an average, of course, the east coast ranges are steeper than the west coast ranges and all these ranges are under the deep mantle of orest cover.

The depressions that lie in between the mountain ranges are either longitudinal bays and in a few cases river valleys. In between the west coast range and Cholunga range in the South Andaman are the Blair Reach and Dalrymple Reach and again in between the Interview Island and the North and Middle Andaman are the Buchanan Passage, Interview Passage and Austin harbour.

Between the Cholunga Range and its continuation and the Mt. Harriet Range and its continuation, lies the School Bay Creek in the South Andaman into which, very short, non-perennial streams flow from the hill ranges of both sides. Again, in between the Baratang hill range and Cholunga Range continuation, lie the Amitla Doicha Passage, Needham Reach and Yaratil Jig, Melagi Bay, Lukhlriwath Bolyo and Arad Bay in the North Andaman.

In between the East West Range of North and Middle Andamans and the Harriet Range continuation in the North, lie the Blair Bay, Kalpong

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Bay, Kalara Bay, Congo Bay etc. in the North Andaman and Betapur river valley and Bomlungta river valley in the Middle Andaman.

Hydrography.

The study of the hydrography of a region includes petamology (study of rivers), limnology (lakes), cryology (snow) and geohydrology (underground water). The study of limnology and cryology of this region can be completely omitted because there is a complete absence of both lakes as well as snows or glaciers. Of the rest the geo-hydrology of the Andamans is little known because no research work regarding this aspect has been conducted.

The petmology or the study of rivers is the most important object of hydrology. The rivers are very short, non-perennial as well as torrential in character. They can better be called as streams because of their seasonal drying up and short length. The Andamans enjoy quite heavy rainfall of about 130", but because of the seasonal fall, the water-level of the streams fluctuates very greatly and in the dry season most of the rivers either do not have any water or have only a trickle of water. Little water in the river valleys may also be partially due to the pervious nature of the soil which does not help the water-table of the region to be sufficiently high. The greater as well as continuous rainfall throughout the year in the South Andaman keep the rivers almost perennial. [132] [134] [132]

The Middle Andaman has only a few little rivers and they are Betapur and Bamlangta rivers. Both of them rise from the hill ranges of the continuation of Mt. Harriet Range in Middle Andaman and flow through the longitudinal valleys, and are interrupted by a great number of spurs from both the eastern and the western hill ranges. The Betapur river rises in the north of Middle Andaman and flows towards the south with a number of tributaries from both the ranges on both the sides. Almost the whole of the northeast Middle Andaman is drained by the Betapur river and its tributaries. According to Mr. Sethi, the country from the place where the Picha Nala meets the Betapur stream, though interrupted by small hills, is almost level for 7 or 8 miles.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2
Negritos

is not in accordance with the opinion that the Andamanese are descendants of shipwrecked Portuguese Negro slaves.' Though this process seems to be very crude for the determination of the exact date of the arrival of the Andamanese, a rough guess can very well be made. Cipriani has also advocated the measurement of the residual radioactivity of charcoal at different levels for the determination of the antiquity of the Andamanese. It is quite obvious that further research in these lines in the future can only give us a more precise idea about the date of the arrival of the aborigines.

The region wherefrom the aborigines arrived and the route of their migration are also matters of considerable controversy. It is believed that the Andaman and Nicobar islands were connected by land with the Arakan folds of Burma in the late Tertiary period, but this is also not very certain. According to Brown, the authority on the anthropology of the Andamans, the negritoes migrated from the Arakan region of Burma if there had been any land connection and if not, they migrated, not by land, but by sea from the Burmese coast (Pegu or Arakan). Brown says, 'The N. E. Monsoon could drift them thence on to the Andamans. It is conceivable that they might have travelled from Sumatra by the way of the Nicobars but the N. E. Monsoon would have appeased their progress in this direction while the S. W. Monsoon would have driven them to the coast of the Andamans. It is hardly possible to imagine them coming from the Malaya Peninsula across the wide stretch of the Andaman Sea. The balance of possibility is in favour of the view that the Andamans were peopled either by land or by sea, from the region of the Lower Burma.'[1] It is probable that the negritoes moved from Burma either at a time when a direct land connection was achieved or when shallow waters in the sea facilitated movement by the rafts of the aborigines, but the former has been considered to be thoroughly untenable because of the absence of any mammalia in the Andamans and this proves that if at all there had been any land connection of Burma and Andamans, it must have been before the evolution of the mammalia. The deep sea researches of Molengraaf (1921) have been utilised by Kaudern (1939)[2] to interpret the probable routes of migration of the negritoes into the Andaman Islands. In the Quaternary period, there had been alternating glacial and interglacial periods because of the

1 Brown, A. R—The Andaman Islands.

2 Kaudern, W—Notes on the geographical distribution of the pygmies and their possible affinities; Etno. Stud. g, 1939.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2
Negritos

174 change of the climate. In the glacial period, there had been a fall in
133 the level of the sea because of the fact that a great volume of water of the sea had transformed into ice. Hence in one such glacial period, as believed by Kaudern, there was a fall of 300 metres in the sea-level which established a direct contact with Burma facilitating the movement of the negritoes into the islands. But the absence of the Negrito group in the Nicobar Islands, only about 100 miles off the Andamans, invokes inquiry. This conspicuous absence of the negritoes in the Nicobars has been explained by Kaudern in this way:

'If the pygmies, when they migrated from the continent towards the south, were able to reach the former (the Andamans) but not the latter islands (the Nicobars), it meant that there has been at some time a fall of sea level of nearly 300 metres, but not as much as 800 metres in these tracts.'[1] As the Ten Degree channel exists between the Andamans and the Nicobars, the movement of the Negritoes further south was stopped.

174 There has been an attempt of linking up some of the tales of Hindu Mythology, Ramayana with the land and people of the Andamans. Detection of such a link has been speculated in search of the origin of the aboriginal population. Though there is no room for doubt of the affinity of the aborigines of the Andamans with the negritoes, as established from the studies of the physical and cultural anthropology, Shri S. K. Gupta, though not an anthropologist, has been a strong advocate of the opinion that the aborigines of the Andamans are the 'kiratas' of Ramayana. He writes, 'According to modern anthropology they are of the negrito stock. But according to Ramayana they are kiratas. These kiratas have been described in our literature as shiny black, with a copper coloured head of hair (Tamramurdhaja), bulging eyes, strong teeth. The description recorded several thousands years ago, holds good to-day. All these tribes have copper coloured curly short hair growing as it were in separate insulated tufts.'[2] Further knowledge about them is that they live on meat and fish.

The affinity of the Andamancse has been further confirmed by citing some native appellations of the Andamanese which show a striking phonetical similarity to those of the kiratas e.g., *Aka-kora* (*da*). *Aka-kede* (*da*), *Aka-kol* (*da*) etc and also the phonetical similarity of the Onge word *Boan* with Santal word *Bonga* both signifying God.

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[113] 1 Kaudern, W—Notes on the geographical distribution of the pygmies etc, Etno. Stud. 9, 1939.

2 Gupta, S. K—Andaman & Nicobar Islands, 1951.

10: Sen K-3, 4 (ca. 1955) 1962 AZ2 Andamans AZ2
Negritos

An outrigger Canoe. (Courtesy A. S. I.)

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An outrigger Canoe with a Burmese Boat (Courtesy A. S. I.)

[facing P. 60]

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2
Nicobars AZ7

CHAPTER ONE

The People of the Islands

In the Bay of Bengal, eight hundred miles to the south-east of Calcutta and a hundred and twenty miles from Cape Nigrais in Burma, the two hundred and four islands of the Andaman archipelago stretch out in a line, with a surface area of 6,495 square kilometres. To the south-east, about a hundred miles away, lie the Nicobars, strung out in a much smaller chain covering only 1,645 square kilometres and made up of twenty-one islands, of which only twelve are inhabited.

The only islands in the Andamans which are permanently occupied are Great Andaman and Little Andaman. The former, three hundred and twenty kilometres long and at no point more than forty kilometres wide, was broken up by geological movement in ancient times into three sections, known as North, South and Middle Andaman. Today these are separated from each other by two narrow straits hardly navigable even by vessels of low tonnage. A much larger passage, the Ten Degree Channel, so called because it is crossed by the 10° north parallel, separates the Andamans from the Nicobars, and incidentally forms a dividing line between ordinarily different worlds, worlds which in the past, as I hope to show, had many characteristics in common.

The Nicobars are peopled by a very ancient Mongoloid race. There are no foreigners permanently resident apart from a family of Moslem merchants from India with a few employees. There are also the Shom-Pen, a small, wild and semi-nomadic group who have been forced back into the forests of Great Nicobar, where they preserve their ancient somatic and cultural characteristics, showing affinities with a Mongoloid people living far away on the chain of islands off the west coast of Sumatra.

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2
Jarawas
Onges

This was a pity, as I knew that my Indian and Burmese companions were ready to run any risk with the prudence they had already shown in Little Andaman towards the Onges. Since North Sentinel is flat and its forest not impassable, a peace mission led by men accustomed to dealing with people like the Andamanese, though it would certainly need more than a brief stay, would probably be ultimately successful.

My sole source of local information on the Jarawas was the wife of a government official, who had tended a pregnant woman and four children who were captured during one of the punitive expeditions on Bluff Island. She gave me a great deal of useful information, and indeed the greater part of our scanty ethnographical and linguistic data on the Jarawas has been obtained through her.

THE ONGES

Until 1952 the attitude of the various groups of Onges was very similar. Along the coast, however, they had already had some contact many years ago with a limited number of outsiders. Compared with the Jarawas they have been uniquely fortunate among surviving primitive peoples in that their extremely fertile territory has remained immune from invasion. In this they have been helped by their geographical isolation as much as by their own ferocity. Indeed Little Andaman, surrounded by an ocean that frequently turns into the proverbial boiling cauldron, presents grave risks to anyone trying to land. I had considerable experience of this myself; on many occasions I nearly gave up when the boat was overturned by giant breakers. On one occasion on the south coast of the island we were flung into the sea, and the empty boat capsized and dragged me down. No one was in a position to come to my rescue, but the momentary relief of an enormous return wave enabled me to extricate myself. The previous day the breakers had crashed down one after another and smashed us against the coral reef which runs right round Little Andaman. Our baggage and provisions had disappeared, and until help arrived we were forced to remain for two gruelling days without water or food, with no protection from the sun and in constant danger of being attacked by the Onges.

During the course of the nineteenth and twentieth centuries

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

CHAPTER TWO

The Silent Forest

133 The whole of the Andamans and Nicobars can be regarded as the top of an oceanic mountain range, an extension of the Arakan mountains of Burma, which continues out under the sea from Cape Nigrais. Geological structure and flora are very similar, although there are some significant differences in the fauna, due to the subsequent isolation of the archipelago.

On Great Andaman there are many rocks of continental origin, but they are rare on Little Andaman, where the surface largely consists of coral deposits on top of sedimentary and volcanic rocks. At some points on the east coast the sea throws up lumps of fine, very hard granite; I found an outcrop of it in Butler Bay, to the north of Hut Bay, and another at Labanar near the river Tejàh. In the central area are some hills of sedimentary rock all less than a hundred metres high, dropping towards the south of the island. The whole of the rest of the island is built up of coral deposit.

Various geological events, still in progress, caused the separation of Great and Little Andaman. The former, three hundred and twenty kilometres north to south, suffered in the course of time two transverse fractures east to west, large enough for fair-sized steamers to pass through. The rift is so narrow that in places one can throw a stone across. These two marine channels, as we have seen, divided Great Andaman into the Islands now known as North, Middle and South Andaman.

The Andamans are still subject to frequent earthquakes, often quite strong ones, which are gradually altering the conformation of the islands just as long ago they divided Great Andaman. From my excavations in the kitchen-middens I was able to verify changes in the level of marine life, due not to any variation in the level of the

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

sea itself, but to the rising and falling of the land with the recurring movements. Even between 1951 and 1952 there was a noticeable alteration in the level of the north-east coast of Little Andaman, following an earthquake in July 1951; the Onges had to move the communal hut at Tambe-e-buiè further inland, because the sea, previously twenty metres away, had begun to come right up to the hut. In several places giant trees centuries old crashed to the ground, their roots left without any foothold as the level of the land fell suddenly all along the coast. If this can happen in one year, it is hardly surprising that what now appears as an archipelago is in reality a continuous mountain chain, its levels broken and rebroken over thousands of years till the islands became separated by the sea for good, their coasts so eroded that subsequent quakes have failed to reunite them.

It is highly unwise even to attempt a landing on Little Andaman during the monsoons. Both the north-east monsoon in June and August and the south-west in November and January whip the seas up into a frenzy, but in late April and again in late September the sea is quite calm. Since both monsoons pass over vast tracts of sea, they become saturated with water vapour and bring torrential rains, not infrequently accompanied by hurricanes violent enough to strip all the leaves off the trees. After these storms the jungle, normally almost impenetrable, is made even more so by the tangle of fallen branches and the trunks of old trees torn up by the wind or the lightning. The lightning strikes the tallest trees, which may smoulder for days on end without setting fire to the sodden forest, so great is the humidity. I have often seen one of these flaming torches; the Onges, ignorant as they are of the art of making fire, take advantage of the phenomenon, as a continuous supply of burning wood is a necessity in a climate which is so damp and humid all the year round that matches become useless after twenty-four hours unless suitable precautions are taken.

Once on the island, virgin forest stretches endlessly before one in undulating waves of treetops, black and terrifying. From the tops of the trees thousands of lianas hang everywhere, winding like snakes from trunk to trunk, forming an inextricable tangle, yet somehow always elegant, binding the entire forest into one dense mass. Many of the tree-trunks reach diameters unheard of in temperate climates. Some of them have hollow cavities, treasured by the Onges as hiding-places or temporary shelters.

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

with, its European counterpart. The spores, attached to a plume barely visible to the naked eye but wonderfully constructed, are carried into the sky by the air currents rising from the pools in the hottest part of the day and travel considerable distances.

One could fill whole books with the botany of the islands but here I can record only a few examples. One I cannot leave out is a species of *ipomea*, or Morning Glory, which flourishes on the sandy beaches in the lee of the coral reefs. The local varieties are not climbers, but spread over the ground in a compact lattice of stems, fairly well able to withstand the onslaught of wind and water. They prevent coastal erosion, both by the protection which their covering of strong stems and leathery leaves provides and by holding fast loose pieces of coral. These *ipomeas* are found only in the Andamans, some with purplish flowers and others white. They surround the communal huts along the coast, carpeting every free inch of ground cleared by the Onges of other and more destructive vegetation. They make no attempt to cut down the *ipomea*, as the compact growth helps their canoes to slide up and down the beach.

Along the coast of Little Andaman one sees rows of beautiful casuarinas (the Whistling Pine) especially a little to the north of Bugong Creek. From out at sea they stand against the skyline like rows of Italian cypress. They never reach the height of which they are capable, owing to the wind and the nature of the terrain; apart from a small stony, hilly area in the interior, of ancient continental origin, the island is really nothing more than a huge coral bank lying against these hills, which in the course of thousands of years has become covered with vegetal mould of no great depth. Trees are therefore forced to send their roots out horizontally, and the strong monsoon winds can easily uproot the tallest of them. After every storm one sees huge trunks lying on the ground, their wide net of roots sticking high into the air. Only a few of the giants in the interior manage to resist, protected by their neighbours. On Great Andaman, where there is more land of continental origin, deep rooting is possible and the forest presents a very different picture.

Much has already been written by others about the epiphytes, among them beautiful ferns and even more lovely orchids, which cling desperately to the trees in their struggle to reach the light. All are closely related to the flora of Burma, Malaysia, and Sumatra,

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7 An important feature of the islands is the way in which the forest comes right down to the water's edge

8 In the monsoon season, trees are frequently uprooted in this manner

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[facing P. 66, F]

11: Cipriani E-3 (1961-1968) 1966 AZ? Andamans AZ?

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9 The bow and arrow is the main weapon used for hunting; in this photograph the archer has the long arrow harpoon used for spearing large fish

10 Fishing in the coral shallows

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[facing P. 66, G]

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

CHAPTER SIX

Food from the Sea

Around the islands, corals stretch out under the water, which is clear and transparent to a depth of several metres so that a riot of colour is clearly visible from the surface. Dazzling as the spectacle is, the first thing that strikes one is the sheer abundance of the coral: it grows slowly, and into the most fantastic shapes. The colours range from white to cream and brown, like leather, or to purple and brilliant blue in streaks tipped with vivid orange, always harmonious, as though gigantic multicoloured flowers have been scattered among the reefs. 133

Many of the corals are similar to those of the Mediterranean in colour and shape, but none have any commercial value for the traders, who look for highly ornamental effects. While the corals invade the rocks in endless masses wherever the water is clear, there are none at the mouths of the rivers. Here they are killed by the impurities brought down to the sea from inland after the floods. This explains the narrow, deep, channels running between the coral formations, corresponding to the flow from the river mouths. Along a coastline that stretches for well over a hundred kilometres I found only two of these channels, one in the north and one in the north-east of the island. Since their existence marks the absence of underwater coral reefs the Indian navy marked them with buoys in my presence in 1914.

All round Little Andaman the ebb tides reveal an expanse of coral reefs stretching as far as the eye can see, which are partially submerged for a few hours every day. Progress over these reefs is both difficult and dangerous. There are edges as sharp as glass everywhere, ready to pierce the skin at the slightest touch, and here and there submerged potholes, which vary in depth from three

11: Cipriani E-3 (1951-1955) 1966 AZ2 Andamans AZ2

133 to six metres or more, with sudden vertical drops and dangerous overhangs. It is here, however, that underwater life is at its most 133 beautiful. Swarms of fish, painted in fantastic variegated stripes, 136 spots and patches in imitation of their surroundings, live among these caverns, rushing about in the wells of deep water. When they are pursued by bigger fish, the shoals will leap suddenly out of the water, only to be caught by the gulls who are always lying in wait for them. I have watched the shoals from the shore, and seen them leap out of the sea to lie gasping on the sand, dying quickly in the heat.

136 Where there are channels in direct communication with the open sea, small sharks slightly over a metre in length move in to meet any swimmers, though a clap of the hands is enough to put them to flight. Fish weighing several kilograms hide in the recesses of the [226] rocks bordering the corals, but they quickly emerge if poked with a stick, and the Onge women have an ingenious system of catching them. Rocks sticking up out of the water swarm with crustacea and tiny molluscs. Apart from the crabs, I was struck by their poor relations, the hermit crabs, comical tenants of all kinds of shells. One species, common in Little Andaman but rare on Great Andaman, is a beautiful tomato red all over, while others are bluish or grey.

The underwater world round the islands is completed by large numbers of several Holothuria, lazy, but conspicuous, and the huge bivalve molusc, *Tridacna* or Giant Clam. Some of these are anything up to a hundred years old and well over a metre in diameter, and weigh between two and three hundredweight. Always open, and incapable of moving from place to place, they feed by means of a multicoloured 'fringe' attached to the hem of each shell, the beating cilia which wave unceasingly causing eddies in the surrounding water and so drawing in plankton from a wide radius. Under normally calm conditions, this process of drawing in and swallowing plankton goes on without stopping, day and night. The huge molluscs look like simple baskets of blue, red, green and white flowers set on the sea bed, but they are in fact terrible creatures. If a man's hand or a foot should be sucked into the quite strong eddy the 'fringe' of cilia immediately folds back and the *Tridacna* suddenly closes like a giant eye silently, viciously, and so violently as to crush completely the limb caught between the two

6:Spate N-4 (no date)1954 AW1 India
[Tinnevelly] Tamil AW17
Andamans AZ2

the river and indeed so practically contiguous that the towns are virtually one.

The real interest of the Tamprabarni, its irrigation apart, lies in the future. The Tamprabarni is probably unique among Indian rivers in that it was harnessed to provide direct hydraulic power for cotton spinning: the first of two turbine-driven mills was set up in 1885. At Papanasam there is a 300-ft fall which is being developed to produce 21,000 kW (ultimate capacity 28,000). The actual engineering work is completed, and full development is limited only by doubts as to the need of conserving water for irrigation; but the possibilities of cheap electricity in this area are manifold: foremost perhaps an increase of well-irrigation in the half-dead edaphically arid tracts, and industrially the revivification of the palmyra sugar industry, the extension of cotton in all its branches. Oilseeds could certainly be more widely cultivated in the red soil area, possibly leading to soap and allied industries, and the hills contain vast reserves of bamboo for paper-making.

The Andaman and Nicobar Islands

These two groups, directly under Delhi, continue the trend of the Arakan Yomas, linking them to the Sumatran ranges. They differ between themselves to a marked extent; both physically and culturally.

1. *The Andamans*

These number over 200, extending NNE/SSW for some 220 miles between 10° and 14° N; the total area is 2500 sq mls, of which the great bulk is in the three major islands of North, Middle, and South Andaman. These three, indeed, are separated only by narrow mangrove-fringed inlets, so that they are often referred to as virtually one island, Great Andaman. The islands are formed of sandstones, limestones, clays, and some serpentines, probably mainly Tertiary, and are highly dissected, rising to 2400 ft. With a temperature never far from 85° F, rainfall over 100 ins., and a monsoonal distribution with no really rainless season, they are naturally jungle-covered: mangrove along coasts and inlets, tropical evergreen along valleys and on steeper wetter slopes, elsewhere moist deciduous. Forestry is perhaps the most important economic activity and is fairly well organised; a match factory was set up about 1930.

The total population in 1941 was 21,316, but this included a strange medley: aboriginals, convicts and ex-convicts with their 'local-born' children, officials. A century ago the aboriginals probably numbered about 5000; in 1931 they were estimated at about 460, in 1941 at 62; many tribes have died right out. At once shy and savage, they had a reputation for ferocity, and early settlement was avowedly to protect shipwrecked